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Environmental Tobacco Smoke: A Guide to Workplace Smoking Policies. Public Review Draft

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ENVIRONMENTAL TOBACCO SMOKE:

A GUIDE TO WORKPLACE SMOKING POLICIES

June 25, 1990
Public Review Draft

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Indoor Air Division
Office of Atmospheric and Indoor Air Programs
Office of Air and Radiation
U.S. Environmental Protection Agency

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This document provides decision makers with information on the technical basis for controlling involuntary nonsmoker exposure to environmental tobacco smoke and to descirbe a variety of technical and policy options for instituting effective smoking restrictions. The draft policy guide includes some information from the as-yet-unfinalized risk assessment.

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NOTE TO REVIEWERS

This draft document is part of EPA's overall effort to characterize indoor air pollution problems and develop strategies for reducing the public's exposure to indoor air contaminants. It is also part of an EPA initiative to address one of the most prevalent and harmful indoor air pollutants: environmental tobacco smoke (ETS). The National Cancer Institute has collaborated in the development of this draft document.

EPA is transmitting this document to its Science Advisory Board (SAB) for comment along with a formal risk assessment of ETS entitled *"Health Effects of Passive Smoking: Assessment of Lung Cancer in Adults and Respiratory Disorders in Children" (EPA/600/6-90/006A)*. The risk assessment seeks to classify ETS according to EPA's carcinogen risk assessment guidelines, to estimate the excess lung cancer deaths attributable to ETS exposure, and to assess the association between passive smoking and respiratory effects. The risk assessment and this document will be the subject of an SAB review meeting. Persons interested in providing comments may obtain a copy of the draft risk assessment by contacting:

ORD Publications Office, CERI-FRN
U.S. Environmental Protection Agency
26 West Martin Luther King Drive
Cincinnati, Ohio 45268
(513)569-7562; FTS 684-7562

A formal Notice of Availability appears in the Federal Register.

This document is intended to provide government and private sector decision makers with information on the technical basis for controlling involuntary nonsmoker exposure to environmental tobacco smoke and to describe a variety of technical and policy options for instituting effective smoking restrictions. The draft policy guide includes some information from the as-yet-unfinalized risk assessment.

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Please review this draft for technical accuracy, completeness, and effectiveness in communicating with a predominantly non-technical audience. Comments **MUST BE IN WRITING, POSTMARKED NO LATER THAN AUGUST 31, 1990,** and should be mailed to:

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Introduction

There are many potential sources of indoor air pollution, including chemicals emanating from building materials, furnishings, and consumer products; gases from combustion appliances like space heaters and furnaces; and biological contaminants from a variety of sources. However, field studies, controlled experiments and mathematical models have shown that **Environmental Tobacco Smoke (ETS) is one of the most widespread and harmful indoor air pollutants and is a major contributor to particulate indoor air pollution.**

The smoke emitted by cigarettes, cigars and pipes contains over 4,000 chemicals, many of which are known carcinogens and toxins. These are inhaled by smokers during the process of smoking, and by nonsmokers who breathe the ETS emitted into the air. The breathing of ETS by nonsmokers is called "passive," "involuntary," "sidestream" or "secondhand" smoking.

The effects of smoking on smokers have been examined in over 50,000 studies conducted over the last 25 years. These have shown that cigarette smoking causes lung cancer, chronic obstructive lung disease, and coronary heart disease. According to the Surgeon General, cigarette smoking is the chief avoidable cause of death in the United States, with the number of premature deaths due to smoking estimated at 390,000[1] annually. The Office on Smoking and Health reports that smoking causes more premature deaths every year than cocaine, heroin, alcohol, fire, automobile accidents, homicide and suicide combined.[2]

The Environmental Protection Agency (EPA) presumes that there is no such thing as a risk-free exposure to a carcinogen. Unless there is evidence to the contrary, EPA believes that any exposure to a cancer causing agent--regardless of level--increases the risk of cancer. The fact that active smoking causes lung cancer, therefore, suggests that nonsmokers exposed to ETS are also at risk for lung cancer, although at a much lower level than smokers.

Recently, scientific studies have examined the link between ETS and lung cancer. In 1986, two major independent reviews examined the impact of ETS on public health. Commissioned by the U.S. Public Health Service (PHS) under the Surgeon General, and by the National Research Council (NRC) at the request of EPA and PHS, both groups arrived at the same conclusion: exposure to ETS significantly increases the risk of lung cancer. Moreover, there was agreement that ETS exposure substantially increases respiratory illness in children and aggravates the conditions of people with heart disease.

In 1990, EPA completed a risk assessment of the health effects of ETS. The report examined the 24 epidemiological studies which have studied the level of risk of lung cancer from exposure to ETS. The risk assessment reached the following conclusions:

According to the EPA classification of carcinogens, ETS is a Group A Carcinogen. Group A Carcinogens are agents known to cause cancer in humans.

The number of ETS-attributed lung cancer deaths in U.S. never-smoking adults is approximately 2,500 annually. The excess number of ETS-related deaths in former smokers is estimated at about 1,300 annually.

The evidence linking ETS exposure to increased lung cancer incidence can not be attributed to chance.[3]

There are also serious non-carcinogenic effects from ETS. In particular, there is a strong association between ETS and respiratory effects on children and there is mounting evidence of heart disease mortality in nonsmokers from passive smoking. The evidence of ETS lung cancer and respiratory disease risks is particularly strong since ETS has been demonstrated to cause health effects at low levels of exposure.

The public health implications of these findings are significant because of the large numbers of people exposed. Tobacco smoke is virtually ubiquitous in our society. Studies show that between 26%[4] and 29%[5] of the U.S. adult population smokes. This is a decline of almost one-third since 1964.[6] However, the people who continue to smoke smoke more than they did before. According to the National Research Council, reported cigarette consumption among heavy smokers has increased from 27.3 to 30 cigarettes per day, and the number of heavy smokers has steadily increased over the past 30 years. As a result, the number of cigarettes smoked each year in the United States has increased, and "the nonsmoker who has close contact with a smoker may be exposed to greater amounts of smoke in 1985 than in 1955."[7]

The magnitude of the problem led the Surgeon General to state in 1986 that "the scientific case against involuntary smoking as a public health risk is more than sufficient to justify appropriate remedial action, and the goal of any remedial action must be to protect the nonsmoker from environmental tobacco smoke."[8] Heeding his words, many nonsmokers have become concerned about their exposure to ETS, and many businesses and governments are now taking steps to protect them from it.

This publication is designed to help the non-expert understand the technical basis for smoking restrictions and to provide guidelines for implementing them. It explains the physical and chemical nature of ETS, how ETS exposure occurs, how it is measured, and the health effects of exposure. It examines passive smoking in the workplace and other sites, and examines legislative, legal, financial, educational and labor concerns. It includes different strategies for reducing exposure to smoking at the workplace along with case studies of policies that have been successfully implemented. Finally it contains a list of resources for those interested in additional information.

Key Points

What is ETS?

Environmental tobacco smoke (ETS) is primarily a combination of sidestream smoke from the burning end of the cigarette, pipe, or cigar, and exhaled mainstream smoke from the smoker.

It contains over 4,000 chemicals, at least 43 of which are known human or animal carcinogens.

Measuring ETS in the Air and Body

Researchers have found that ETS diffuses rapidly through buildings, persists for long periods after smoking ends, and represents one of the largest sources of indoor particle pollution.

Certain constituents of tobacco smoke can be found in the body fluids of nonsmokers who were exposed, indicating that they have inhaled and retained ETS.

Health Effects of ETS

According to the EPA classification of carcinogens, ETS is classified as a Group A Carcinogen. Group A Carcinogens are agents known to cause cancer in humans.

ETS exposure is associated with respiratory problems and an increased frequency of ear infections in young children.

ETS may aggravate the conditions of people with existing heart and respiratory disease.

Since there is no established health-based threshold for exposure to ETS, and since EPA generally does not recognize either a no-effect or safe level for cancer causing agents, the Agency recommends that involuntary nonsmoker exposure to ETS be eliminated wherever possible.

How Big is the Risk from ETS?

The number of ETS-attributed lung cancer deaths in U.S. never-smoking adults is approximately 2,500 annually. The excess number of ETS-related deaths in former smokers is estimated at about 1,300 annually.

Reducing Exposure to ETS

Nonsmokers' ETS exposure can be eliminated by: creating enclosed, separately ventilated smoking rooms with direct external exhaust, or prohibiting smoking indoors.

ETS exposure can be reduced through a number of techniques. These include: creating separate walled areas for smokers and nonsmokers with a shared ventilation system, creating separate unwalled areas for smokers and nonsmokers, air cleaning, air washing and time separating smokers and nonsmokers. The effectiveness of each of these techniques in reducing ETS varies.

Regulating Smoking and ETS

The number of communities with legislation restricting smoking jumped from 90 in 1985 to 450 in 1989.

Most ordinances give higher priority to protecting nonsmokers from environmental tobacco smoke over smokers' preference to smoke.

Developing Effective Smoking Policies

To succeed, smoking policies need the support of top management.

Policies should be developed with employee and labor union input.

Whenever smoking policies are introduced, smoking cessation programs should be made available to employees who want to quit.

Cost Savings Related to ETS Reduction

Organizations that have implemented policies that restrict or eliminate ETS-exposure report some cost savings.

Public Attitudes Toward ETS

86% of all Americans (smokers and non-smokers) believe ETS is dangerous to their health.
69% of all Americans (smokers and non-smokers) are annoyed by ETS.
77% of all Americans (smokers and non-smokers) believe that smokers should not smoke in the presence of non-smokers.

Recommendations

Based on the significant health risks associated with ETS, organizations should, wherever possible, eliminate involuntary exposure to ETS at work.

Involuntary exposure to ETS can be eliminated by creating enclosed, separately ventilated smoking rooms with direct external exhaust, or by prohibiting smoking indoors.

Whenever smoking restrictions are introduced, smoking cessation programs should be made available to employees.

Employees and labor unions should be involved in the development of smoking control policies in the workplace.

Part I:

ENVIRONMENTAL TOBACCO SMOKE: THE PROBLEM

Based on a review and analysis of 24 epidemiological studies which examine the association between ETS and lung cancer, EPA has confirmed the earlier findings of the Surgeon General and the National Research Council that ETS causes lung cancer in humans. The following chapters examine this and other problems created by ETS.

Chapter 1: WHAT IS ETS?

ETS is a complex substance composed of over 4,000 constituents. This chapter reviews its physical and chemical nature.

Chapter 2: MEASURING ETS IN THE AIR AND BODY

With air monitoring, biomarkers, questionnaires and mathematical models, researchers are able to assess the presence of ETS in the air and in the human body. This chapter explains how these techniques are used in order to confirm nonsmokers' ETS exposure.

Chapter 3: HEALTH EFFECTS OF ETS

ETS is a Group A, or known, human carcinogen. This chapter reviews the risk of lung cancer and other illnesses in nonsmokers as a result of ETS exposure.

Chapter 4: HOW BIG IS THE RISK FROM ETS?

EPA estimates that approximately 2,500 never-smoking adults and 1,300 former smokers die annually in the United States as a result of exposure to environmental tobacco smoke. This chapter reviews these and other findings from the EPA risk assessment of ETS.

CHAPTER 1: WHAT IS ETS?

Environmental tobacco smoke (ETS) is primarily a combination of sidestream smoke from the burning end of the cigarette, pipe, or cigar, and exhaled mainstream smoke from the smoker.

Sidestream Smoke (SS) is the smoke emitted by the burning end of cigarettes, pipes and cigars between and during puffs. The stronger a smoker inhales, the more sidestream smoke is emitted. For the average smoker, approximately 55% of the cigarette is burned between puffs, making sidestream smoke the largest constituent of ETS.[9]

Mainstream Smoke (MS) is smoke inhaled by the smoker. Smokers exhale approximately 18%[10] of the smoke they inhale, making exhaled mainstream smoke the second largest constituent of ETS.

Gases that escape through the cigarette paper as the cigarette is being smoked account for a relatively small percentage of ETS.

ETS is a cloud of fine particles and liquids suspended in gases. For the purposes of studying it, scientists have broken it into two components, called "phases." The **particulate phase** contains particles approximately one-tenth of a micrometer and larger. Particles that are smaller than one-tenth of a micrometer are called the **gas phase**. Together, the particles in the particulate and gas phases of ETS contain over 4,000 chemicals, at least 43 of which are known carcinogens.[11]

DIFFERENCES BETWEEN MAINSTREAM AND SIDESTREAM SMOKE

ETS differs from mainstream smoke in two important ways: particle size and chemical make-up.

Particle Size

The particles in ETS are smaller than those in mainstream smoke. This allows them to be absorbed deep into the small air sacs of the lungs.

The average size of mainstream particles is relatively large---seven tenths of a micrometer.[12] Because the smoke is very concentrated, the particles tend to clump together, forming even larger particles as they are inhaled. As a result, they are deposited mainly in the mouth and larger airways of the smoker's lungs.

Most sidestream particles, on the other hand, are much smaller---between two and four tenths of a micrometer.[13] The smoke is dilute, and the small particles tend to be absorbed deep into the small air sacs of the lung, where approximately 10% of them remain. The dose absorbed is small, but after absorption, the chemicals circulate widely in the body, tending to remain in the body longer than mainstream smoke in active smokers.[14]

Chemical Make-Up

Sidestream smoke contains more toxic and carcinogenic chemicals than mainstream smoke, although the concentrations are much higher in active vs. passive smokers.[15] An analysis of 15 Canadian cigarettes showed that their sidestream smoke contained 3.5 times the amount of tar and 6.6 times the amount of nicotine than was present in their mainstream smoke.[16] A study compared the amounts of nine toxic compounds in the mainstream and sidestream smoke of four U.S. cigarettes. In all nine chemicals studied, the amount in sidestream smoke was significantly higher than the mainstream smoke level.[17]

The tar and nicotine sidestream yields do not decrease proportionately with the cigarette mainstream yields.[18] This means that manufacturers' efforts to reduce tar and nicotine consumption for smokers by introducing filtered and low-tar, low-nicotine cigarettes, has not reduced involuntary exposure to these chemicals. In some cases, it may have actually increased it.

OTHER CONTAMINANTS

In addition to chemicals that are intrinsic to tobacco, or caused by its burning, cigarette smoke may also contain pesticides and herbicides. The Surgeon General has observed that although there has been a reduction in the use of agricultural chemicals, "it is fairly certain that commercial tobaccos contain up to a few parts per million of DDT, DDD, and maleic hydrazide; fewer than 20 percent of these contaminants are transferred into the smoke stream."[19]

It is difficult to document exactly which contaminants or additives are present in ETS because there are no government requirements for the disclosure of tobacco constitutents. The identity of all contaminants, along with other compounds added in the manufacturing process, is regarded as confidential information by cigarette manufacturers.[20]

HAZARDOUS CONSTITUENTS IN ETS

Many of the chemicals in ETS are known carcinogens, mutagens, toxins or irritants.

Carcinogens and Mutagens

Carcinogens are agents capable of causing cancer. Mutagens are agents capable of causing permanent, often harmful, changes in cells, some of which may lead to cancer. ETS has both.

Of the 99 compounds in tobacco smoke that have been studied in detail, at least 43 are complete carcinogens,[21] each able on its own to cause the development of cancer in humans or animals. Other ETS constituents are tumor initiators, capable of carrying out the first steps in cancer development. Still others are tumor promotors, able to accelerate the development of cancer.

ETS also contains chemicals that are co-carcinogens, able to cause cancer when combined with another substance. It contains cancer precursors, compounds that pave the way for formation in the body of other carcinogenic chemicals. And it contains other compounds that damage the cilia, or cleansing hairs, of the lungs, making them less able to clear the lungs of deposited tars. This allows cancer-causing chemicals to remain.

In his 1979 report, the Surgeon General cites 27 known tumor initiators, three groups of tumor promotors, and 18 compounds or groups of compounds that are co-carcinogens as known components of tobacco smoke.[22]

Sidestream smoke is known to have significantly higher concentrations of carcinogens and mutagens than mainstream smoke. For example, the tumor initiators N-nitrosamines are found in quantities up to 100 times greater in sidestream smoke.[23]

Chemical analysis of the smoke from pipes, cigars and cigarettes indicates that carcinogens are found in similar levels in each. Experimental studies have shown that smoke condensates from pipes and cigars are equally, if not more, carcinogenic than those from cigarettes.[24]

Toxins and Irritants

In addition to its carcinogenic constituents, ETS contains a variety of other chemicals that are harmful to humans. Examples include:

Carbon monoxide is a gas that interferes with the ability of the blood to carry oxygen. Carbon monoxide levels increase when smokers are present, adding to the body burden of carbon monoxide from other environmental sources.

Hydrogen cyanide interferes with the action of the tiny cilia hairs in the lungs. It is also an extremely strong lung irritant and more potent than carbon monoxide in its ability to starve one of oxygen.

Ammonia is a powerful eye and respiratory irritant.

Nicotine, a poison, is also the addictive agent in tobacco smoke.

Sidestream smoke has been documented to contain more of each of these compounds than mainstream smoke.[25]

Toxic and Cancer-Causing Agents in Mainstream and Sidestream Cigarette Smoke

Smoke Constituents	Unfiltered Cigarette	Filtered Cigarette A	Filtered Cigarette B	Low Tar Cigarette with Perforated Filter
Tar (mg)	20.1	15.6	6.8	0.9
	22.6	24.4	20.0	14.1
Nicotine (mg)	2.04	1.50	0.81	0.15
	4.62	4.14	3.54	3.16
Carbon monoxide (mg)	13.2	13.7	9.5	1.8
	28.3	36.6	33.2	26.8
Catechol (μg)	41.9	71.2	26.9	9.1
	58.2	89.9	69.5	117
Benzo(a)pyrene (mg)	26.2	17.8	12.2	2.2
	67.0	45.7	51.7	44.8
Ammonia (μg)	76.0	19.4	34.0	40.4
	524	893	213	236
Nitrosodim-ethylamine (ng)	31.1	4.3	12.1	4.1
	735	597	611	685
Nitrosopyr-rolidine (mg)	64.5	10.2	32.7	13.2
	117	139	233	234
Nitrosonor-nicotine (ng)	1007	488	273	66.3
	857	307	185	338
4-(methylnitrosamino)-1-(3-pyridyl)-1-butanone	425	180	56.2	17.3
	1444	752	430	386

☐ Mainstream Smoke ☐ Sidestream Smoke

Source: NAS, 1986

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CHAPTER 2: Measuring ETS in the Air and Body

Historically, when researchers studied environmental air pollutants, they focused on large outdoor sources such as industrial emissions, toxic wastes, and auto exhaust. They used stationary monitors to determine what pollutants were present, and in what quantities.

Recently, however, scientists have turned attention indoors. Because many people spend up to 90% of their time inside, indoor air forms the largest part of what we breathe. Thus, even small amounts of indoor pollutants may cause as much risk as vast amounts of those materials outside.[26]

Recent technological advances make the measurement of many indoor pollutants possible. Sensitive monitors enable scientists to analyze the chemical and particulate composition of indoor air. Sophisticated portable monitors permit them to monitor an individual's personal airspace as he or she moves through numerous environments over several hours or days. And detecting pollution-derived chemicals in an individual's saliva, urine, or blood enables scientists to confirm exposure. Scientists are now using these techniques as well as mathematical models to study ETS-exposure.

DEFINING EXPOSURE

Nonsmokers' exposure occurs when they encounter ETS-polluted air. The extent of their exposure is determined by **how long** they breathe the polluted air, and by the **concentration** (or density) of ETS in the air. Concentration is affected primarily by the number of smokers present, the rate at which they smoke, the ventilation conditions in the room or building, and how large a space it is.

When people are exposed to ETS, some smoke particles remain in the body while others are exhaled. Those that remain are called the **dose**. A person's dose is affected by the amount of smoke to which he or she is exposed, the duration of exposure, and breathing rate. People engaged in physical activity, for example, will inhale and retain larger quantities of air than those who are motionless. Currently, scientists are able to measure a person's exposure to ETS and the dose of certain constituents, but are not yet able to directly measure the total dose of smoke inhaled and retained.

ASSESSING ETS EXPOSURE

Researchers have several ways of assessing ETS exposure.

Air monitors measure the amount of certain constituents of smoke in a given air space.

Biological markers are indicators of exposure in a person's body fluids.

Questionnaires ask people about their exposure.

Mathematical models calculate the degree of exposure that is likely in a given airspace.

Since 1981, approximately 50 studies have been done of ETS concentrations in buildings. Using these methods, researchers have found that **ETS diffuses rapidly through buildings, persists for long periods after smoking ends, and represents one of the major sources of indoor particle pollution.**

Air Monitoring Studies

Air monitoring is done two ways. Stationary monitors are used to measure the amount and types of air-borne pollutants in a particular space; personal monitors are portable gauges carried by individuals to measure the pollutants they are exposed to as they move through a variety of environments over a period of time.

However, neither type of monitor measures all the components of ETS because the number of constituents is too large. Instead, **surrogates** are used, chemicals that are accurate indicators of the presence and quantity of ETS. The most commonly used surrogate is **respirable suspended particulates** (RSP). RSP refers to the tiny particles, small enough to be inhaled deeply into the lungs, that are present in all air. These particles come from dust, cooking, household chemicals and many other objects in our environment. However, studies show that where smoking is permitted, ETS is the major contributor to RSP in indoor air.[27]

Stationary air monitor studies have compared RSP levels in the homes of smokers and nonsmokers. They found that each smoker generates 25 to 35 micrograms of RSP per cubic meter of air (µg/m3). Homes with two or more heavy smokers frequently exceed the federal 24-hour outdoor particle standard of 260 µg/m3. In homes with heavy smokers, short-term particulate concentrations of 500 to 1,000 µg/m3 are not uncommon.[28]

Studies of public buildings duplicate these findings. Levels in non-smoking buildings, such as churches, libraries and museums, had low levels of RSP. By contrast, restaurants, bars and bus stations, where smoking is permitted, had RSP levels ten to twenty times as high.[29] [30] The highest RSP levels were found in designated smoking areas, where the level of RSP correlated with the number of cigarettes smoked. One office building had RSP levels of 11 µg/m3 in its nonsmoking offices, and 520 µg/m3 in a smoking lounge.[31] In the smoking section of an airplane, RSP levels were five times higher than in the nonsmoking section, reaching 1,000 µg/m3.[32]

Personal air monitor studies found similar results. Nonsmokers who were exposed to smokers recorded significantly higher levels of RSP than did those who were not exposed.

This was true for children with smoking parents (compared to children of nonsmokers), and for adults exposed to smoke both at home and at work.[33] [34]

Biomarker Studies

Some of the constituents unique to tobacco smoke can be found in the body fluids of people who were exposed to smoke, indicating that they have inhaled and retained ETS. Scientists use these chemicals as biomarkers, indicators of ETS exposure. They are not direct measures of the total dose of ETS the individual inhaled.

Cotinine is the most commonly used biomarker. Since it is totally unique to tobacco, it is a reliable indicator of ETS exposure. Nicotine breaks down in the body into cotinine, a chemical easily measured in blood, saliva and urine.

Studies show that cotinine levels are higher in people who report they have been exposed to tobacco smoke than in those who report they have not. Studies have shown a relationship between cotinine levels and ETS exposure.[35] Cotinine levels show that infants absorb nicotine from passive smoking as well as from breastmilk.[36] Cotinine has also been measured in the urine of people who were unaware they had been exposed. In fact, in several British studies, nearly all nonsmokers had measurable cotinine levels, regardless of reported exposure. Positive cotinine concentrations in three out of four nonsmokers, including persons reporting no exposure to tobacco smoke in the measuring period (up to a few days, depending on the body fluid tested), demonstrate the ubiquity of ETS exposure in nonsmokers.[37]

Other Surrogates

While RSP and nicotine are the most widely used surrogates for ETS, researchers have studied other surrogates as well.

Air monitor studies have shown **nicotine** levels considerably greater in homes with smokers than in homes without.[38]

Benzene, a hazardous air pollutant which is regulated in outdoor air by EPA because it causes leukemia in humans at occupational levels, has been found at average levels 50% higher in homes with smokers than in homes without.[39] People exposed to ETS at work over 50% of the time, have shown significantly higher breath concentrations of benzene than those exposed less often.[40] For smokers, cigarettes are the greatest source of benzene exposure in the environment. For passive smokers, ETS is a significant source of benzene exposure.

Questionnaires

Surveys or questionnaires are frequently used to determine ETS exposure. They typically inquire about smoking habits of family, friends and co-workers and the level of the resulting ETS exposure. Asking people about their ETS exposure has several potential limitations. First, questionnaires usually only can address short term exposure and do not provide an indication of dose over a lifetime. Second, most questionnaires have limited the discussion of ETS exposure to the home, while a large amount of the exposure may take place away from the home (at work or in public places). Third, it is often difficult to measure and quantify ETS exposure at work. Even with these limitations, questionnaires have proved to be an effective tool to distinguish between populations that receive a high level of exposure and those that receive a smaller level.

Mathematical Models

Mathematical models involve measuring and analyzing a number of factors to determine total ETS exposure from a given space. The first step in the process requires measuring with monitors the concentration of various ETS constituents. These pollution levels are combined with information concerning the amount of time an individual will spend in the area to develop an average level of exposure. Finally, the calculations review the factors which control the contaminant levels in the space (these may include the number of cigarettes smoked, amount of ventilation in the space, etc.). Mathematical models have been developed and tested for accuracy and have proved to be a reasonable way to estimate ETS exposure.

CHAPTER 3: Health Effects of ETS

Studies show that for healthy adults, the acute respiratory effects of short-term ETS exposure can vary from none to moderate irritation. Regular long-term ETS exposure can cause chronic irritation and lung cancer. Susceptible sub-populations (those with special sensitivity to ETS) are at greater risk. Researchers are also examining the effects of ETS on the cardiovascular system and other parts of the body.

IRRITATION

Whereas short-term visitors to a smoking area may be annoyed by tobacco smoke odors, nonsmoking occupants of the area are more likely to complain about burning, itchy eyes.[41] This occurs when the water-soluble chemicals in tobacco smoke dissolve in the liquid of the eyes, causing reddening, itching and tearing. For many people the effect is annoying; for some it can become incapacitating.

ETS can also cause irritation in the nose and throat when the smoke's water-soluble chemicals dissolve there, irritating the mucous membranes. The result is generally a sore throat or cough. Other short-term effects of ETS exposure include wheezing, dizziness, headaches or nausea.[42] Studies in both laboratories and real-life situations show that irritation increases with exposure, although a few studies have suggested that irritation levels off after about an hour.[43]

LUNG CANCER

Since active smoking causes lung cancer, it is reasonable to believe that exposure to ETS might also increase a person's risk of developing the disease. To investigate that possibility, several researchers have conducted epidemiological studies of exposed nonsmoking populations.

In early 1981, researchers in Greece reported a significant increase in lung cancer among nonsmoking women married to smokers.[44] At about the same time, similar results were reported from a methodologically different study in Japan.[45]

These three studies fueled serious concern about the lung cancer risks of ETS. As a result, in the mid-1980's, the Surgeon General and the National Research Council each convened scientific panels to study the matter further. Their reports were issued in 1986. Both concluded that passive smoking causes lung cancer.

The Surgeon General based his conclusion on three facts: active smoking causes lung cancer; there are qualitative similarities between ETS and mainstream smoke; and epidemiological studies show a positive association between lung cancer deaths in nonsmokers and ETS exposure. The Surgeon General stated, "Involuntary smoking is a

cause of disease, including lung cancer, in healthy nonsmokers." He added, "In examining a low-dose exposure to a known carcinogen, it is rare to have such an abundance of evidence on which to make a judgment."[46]

The National Research Council reached the same conclusion in a somewhat different way. They found that laboratory studies show that it is biologically plausible for ETS to cause cancer in human cells, and that epidemiological studies confirm a link between lung cancer in nonsmokers and ETS exposure.[47]

In 1989, a formal risk assessment of lung cancer and ETS was undertaken by EPA's Offices of Research and Development and Air and Radiation. After review and analysis of 24 epidemiological studies,[48] they concluded that **ETS is a Group A carcinogen according to the EPA's classification of carcinogens**. Group A Carcinogens are agents known to cause cancer in humans. This comprehensive review also concluded that the epidemiological evidence linking ETS exposure to increased lung cancer incidence cannot be attributed to chance.[49]

Since there is no established, health-based threshold for exposure to ETS and since EPA generally does not recognize either a no-effect or safe level for cancer causing agents, the Agency recommends that exposure to ETS be eliminated wherever possible.

The number of lung cancer deaths attributable to ETS exposure is discussed in the next chapter.

RESPIRATORY DISEASE

Respiratory disease has also been linked to ETS exposure in children. ETS may also cause respiratory disease in adults. Several studies have reported small declines in lung function in nonsmokers exposed to ETS, but whether ETS exposure alone would cause chronic obstructive lung disease in otherwise healthy adults is unclear.

IMPACT ON SUSCEPTIBLE POPULATIONS

The strong irritants in ETS may exacerbate conditions in especially sensitive individuals. These include children and the approximately 10% of the population suffering from asthma, emphysema, bronchitis and chronic sinusitis. Also potentially at risk are people with allergies, other respiratory conditions, heart disease and circulatory disease. All of these conditions may be aggravated by exposure to ETS. These are discussed in more detail below.

CHILDREN

Studies have documented that 54% to 75% of American children live with smoking adults.[50] Children, therefore, represent an extremely large exposed population. In fact, exposure to ETS may begin in utero since fetuses of nonsmoking mothers have shown absorption of

ETS constituents.[51] ETS exposure continues after birth, as infants drink breast milk contaminated with ETS constituents and breathe ETS polluted air.

While tobacco smoke absorption can be dangerous for adults, it is especially so for children. Children have been shown to absorb more nicotine from ETS than adults,[52] they are exposed over a longer period of time, and their developing respiratory systems may be especially vulnerable to toxic damage.

The most common health effects in children are symptoms of respiratory irritation and infection. Children of smoking parents wheeze more, cough more, have more phlegm, and have higher rates of pneumonia and bronchitis than children of non-smoking parents. They are also hospitalized more often for these respiratory infections. The level and frequency of illness correlates with the number of cigarettes smoked by the mother (presumably a father's smoking has less bearing on his child's health because he typically spends less time with the child).

ETS exposure in children is associated with mild impaired lung growth. Some studies suggest that ETS exposure in utero may alter the growth pattern of the fetal lung, which may cause increased respiratory infections in later life.[53] And children with at least one smoking parent seem to have slower growth of lung function than do children with nonsmoking parents.[54]

A third effect is ear infections. Young children exposed to ETS have higher rates of chronic ear infections and middle-ear effusions than children who are not exposed.[55]

While the specific effects of ETS on children are still being investigated, the general conclusion is clear. In the words of the National Research Council, **"it is prudent to eliminate ETS exposure from the environments of small children."**[56]

ASTHMATICS

Some people with asthma report that exposure to ETS increases their symptoms, and several studies have documented this effect. However, other studies have shown little difference between asthmatics' reactions to ETS and that of healthy nonsmokers. At this time, the data are too limited to draw conclusions.[57] [58]

PEOPLE WITH HEART DISEASE

Some studies have shown that ETS can aggravate the conditions of people with existing heart disease. By increasing the levels of carboxyhemoglobin and carbon monoxide in the blood, ETS decreases the ability of the heart to contract and pump.[59] This raises the blood pressure of people with heart disease.[60] A complete analysis of the data linking ETS and heart disease has not been conducted by EPA.

PEOPLE WITH ALLERGIES

People with allergies (as well as the allergy-prone) frequently develop allergic-type reactions to ETS: headache, sore throat, wheezing and nausea. This has prompted researchers to investigate the possibility of a tobacco smoke allergy; however, it is still too early to know if such an allergy exists.[61]

OTHER POTENTIAL HEALTH EFFECTS

HEART DISEASE

The data available at the present time are insufficient to conclude that ETS causes heart disease but it appears that some association may exist. Although several epidemiological studies[62] that have examined the relationship between ETS and heart disease have concluded that ETS exposure is associated with increased risk of heart disease, the relationship between the two is still a subject of debate within the scientific community. As noted above, EPA has not conducted a full review of this literature.

CANCER AT OTHER SITES

A small number of studies have examined the relationship between ETS exposure and cancer at sites other than the lung. At this point the data are too limited to be conclusive. However, some studies of nonsmoking women found higher cancer rates among those whose husbands smoked than among those whose husbands didn't. These cancers included brain tumors and nasal sinus cancers,[63] genital, breast and endocrine cancers,[64] and cervical cancer.[65] Studies of children have found increased risk of cancer in those whose parents smoke,[66 67 68] and a study of infants found that those whose mothers were exposed to ETS while pregnant had a higher risk of developing brain tumors.[69] Additional research is needed in this area.

CHAPTER 4: How Big is the Risk From ETS?

To estimate the number of nonsmokers who die from lung cancer each year due to ETS exposure, EPA conducted a comprehensive risk assessment of ETS in 1989-90 entitled "*Health Effects of Passive Smoking: Assessment of Lung Cancer in Adults and Respiratory Disorders in Children*".[70] The study reviewed and analyzed the data from 24 epidemiological studies on ETS and lung cancer, including those that have been done since the 1986 reports of the Surgeon General and the National Research Council.[71]

THE EPA RISK ASSESSMENT

The risk assessment focused on never-smoking women married to smokers because this is the most studied group. The report estimates that approximately one-fourth of all lung cancer deaths in never-smoking women are due to ETS exposure. This equals approximately 1,750 deaths annually in U.S. never-smoking women from all ETS exposure.

The data on ETS-related lung cancer deaths in never-smoking males are sparse. The available evidence suggests that the individual risks for men and women are comparable, although the total number of men never-smokers exposed to ETS is considerably smaller than the number of exposed never-smoking women. This translates into approximately 750 deaths in U.S. never-smoking males annually from all ETS exposure. If the same risks hold for ex-smokers, ETS exposure would be responsible for an additional 1,300 deaths annually for both sexes.

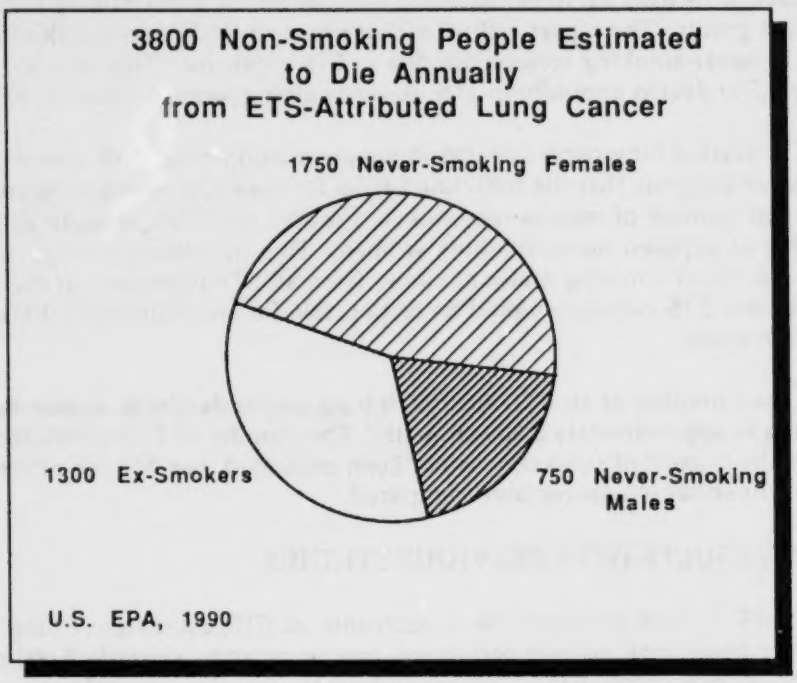
Therefore, **the total number of all ETS attributed lung cancer deaths in nonsmoking U.S. women and men is approximately 3,800 annually**. The number of ETS-attributed lung-cancer deaths in current smokers has not been estimated, nor has the effect of home vs. occupational or social exposures been compared.

COMPARING RESULTS WITH PREVIOUS STUDIES

In a recent review[72] of nine previous risk assessments on ETS, estimates of lung cancer deaths in eight of these were in close agreement, averaging approximately 5,000 deaths per year in nonsmokers exposed to ETS. These assessments were done in different ways, some quantifying ETS exposure in terms of "cigarette equivalents" and using mathematical models to extrapolate down to environmental levels. The EPA risk assessment estimates the percent of the risk attributable to ETS, based on actual studies at true environmental levels. This eliminates the need for mathematical extrapolation models. EPA estimates of attributable risk, approximately 25% of all nonsmoker lung cancer deaths, is also consistent with those of others, including the NRC.

PUBLIC HEALTH IMPLICATIONS

Based on EPA's estimate that approximately 2,500 never smoking adults and approximately1,300 former smokers die from lung cancer each year as a result of exposure to environmental tobacco smoke, ETS is an important public health concern. **Because of the ubiquity of tobacco smoke in our society, even a small increase in the risk of lung cancer from exposure to ETS translates into a significant health hazard to the U.S. population.**


3800 Non-Smoking People Estimated to Die Annually from ETS-Attributed Lung Cancer
1750 Never-Smoking Females
1300 Ex-Smokers
750 Never-Smoking Males
U.S. EPA, 1990

PART II

ENVIRONMENTAL TOBACCO SMOKE: THE SOLUTIONS

A variety of strategies have been developed to mitigate nonsmokers' exposure to ETS. These strategies vary in effectiveness, implementation cost and inconvenience to smokers. The following chapters explore issues to consider in policy development, the range of policy alternatives and successful implementation strategies to reduce or eliminate involuntary ETS exposure.

Chapter 5: REDUCING EXPOSURE TO ETS

Nonsmokers' ETS exposure can be eliminated by creating enclosed, separately ventilated smoking rooms with direct external exhaust, or by prohibiting smoking indoors. ETS exposure can be reduced through a number of techniques including separate walled areas for smokers and nonsmokers with a shared ventilation system, separate unwalled areas for smokers and nonsmokers, air cleaning, air washing and time separation. The effectiveness of each of these strategies will be reviewed in this chapter.

Chapter 6: REGULATING SMOKING AND ETS

There are federal, state and local regulations that have an impact on ETS exposure. There have also been lawsuits concerning involuntary exposure to ETS in the workplace and suits by smokers to establish a right to smoke. This chapter examines the impact of legislation and litigation on involuntary exposure to ETS.

Chapter 7: DEVELOPING EFFECTIVE SMOKING POLICIES

The workplace may be the greatest source of ETS exposure for many nonsmoking adults. However, ETS exposure can be effectively reduced or eliminated from the workplace with carefully developed smoking policies. This chapter discusses strategies for developing effective policies.

Chapter 8: COST SAVINGS RELATED TO ETS REDUCTION

Organizations that introduce smoking policies report a variety of cost savings. This chapter reviews cost savings directly and indirectly related to reducing ETS in the workplace.

Chapter 9: PUBLIC ATTITUDES TOWARD ETS

Public opinion tends to support smoking restrictions in public places. This chapter reviews the major public opinion surveys in this area.

CHAPTER 5: Reducing Exposure to ETS

The ability of ETS to spread quickly through the air makes it virtually ubiquitous in indoor spaces where smoking is permitted. However, ETS exposure can be eliminated or reduced through a number of techniques. These include: prohibiting smoking indoors, creating separate smoking lounges with separate ventilation, creating separate walled areas for smokers and nonsmokers with a shared ventilation system, creating separate unwalled areas for smokers and nonsmokers, air cleaning, air washing and time separating smokers and nonsmokers. The effectiveness of each of these techniques in reducing ETS varies.

This chapter discusses each of these techniques. How they can be integrated into successful smoking policies is discussed in Chapter 7.

Prohibit Smoking Indoors

The most effective way to eliminate ETS exposure for nonsmokers is to prohibit smoking indoors. This is also, generally, the least expensive method of eliminating ETS from indoor air because it doesn't require changes to the existing ventilation system and may also reduce long term energy costs. However, a smoking prohibition may be inconvenient to those smokers who continue to smoke and must leave the building to do so.

Part Three of this guide contains case studies of organizations that successfully prohibited smoking in the workplace.

Create Separate Smoking Lounges With Separate Ventilation

Creating enclosed smoking areas with separate ventilation can eliminate nonsmokers' exposure to ETS without forcing people who want to smoke to go outside. A smoking room can be designed to protect nonsmokers from the health risks of ETS and to provide smokers additional ventilation while they are inside the room.

To be properly ventilated, a smoking room should meet three requirements:

The smoking room should have **a separate ventilation system**. This means that air from the room should be immediately exhausted outside rather than being recirculated through the building. The average building recirculates the vast majority of its air supply.

The room should have **at least 60 cubic feet per minute (cfm) of outdoor air per smoker to control ETS odors**. The average for the typical office is 5-20 cfm of outdoor air, which is inadequate to effectively reduce the level of ETS when smokers are present.

The room should be slightly **negatively pressurized** to prevent backstreaming of smoke into the nonsmoking areas of the building. This means that the air pressure inside the room

should be somewhat lower than the air pressure outside. The average building is positively pressurized.

Part Three also contains examples of organizations that have successfully established separately ventilated, indoor smoking rooms.

Create Separate, Walled Areas For Smokers and Nonsmokers With a Shared Ventilation System

A common mitigation strategy is to create separate areas for smokers and nonsmokers, each walled off from the other. This may reduce nonsmokers' ETS exposure. However, it does not eliminate ETS pollution. As long as the two spaces share a ventilation system, their occupants will breathe the same air. Polluted air from the smoking rooms will be recirculated to nonsmoking areas.

A second problem with this strategy is that ETS diffuses easily through doorways and windows. Therefore the smoke will not remain in the room, but will seep into neighboring nonsmoking spaces.[73]

Create Separate, Unwalled Areas For Smokers and Nonsmokers

This is the most common mitigation strategy, and is often employed in restaurants. Smokers and nonsmokers share one space which is divided into "smoking" and "nonsmoking" areas.

This arrangement may be preferable to seating smokers and nonsmokers side by side, because it reduces the amount of ETS in the immediate area. However, it does not eliminate ETS exposure. ETS particles spread readily throughout a room, polluting nonsmoking as well as smoking areas. For this reason, the Surgeon General has stated that "simple separation of smokers and nonsmokers within the same air space may reduce, but does not eliminate, the exposure of nonsmokers to environmental tobacco smoke."[74]

Air Cleaning

"Air cleaning" is a generic term that refers to three general types of devices.

Mechanical filters: these use a filter to trap particles. There are two main categories of mechanical filters. Flat filters, which will efficiently collect large particles but remove only a small percentage of respirable-sized particles and pleated filters which generally attain greater efficiency in capturing respirable-sized particles.

Electronic air cleaners: these trap charged particles using an electrical field.

Ion generators: these use static energy to charge the particles. Once charged the particles are attracted to walls, floors, table tops, draperies, occupants, and other surfaces. Some ion generators contain a collector to attract the charged particles back to the unit.

Some of the newer machines on the market are referred to as **"hybrid"** devices. They contain two or more of the types of particle removal mechanisms discussed above. Mechanical filters, for example, may be combined with an electrostatic precipitator or an ion generator.

Air cleaners can be in-duct devices, installed within a building's heating, ventilating and air conditioning (HVAC) system, or can be free-standing, portable devices. The effectiveness of air cleaners in removing pollutants from the air depends on both the efficiency of the device itself (the percentage of the pollutant removed as it goes through the device) and the amount of air handled by the device.

Portable air cleaners vary in size and effectiveness in pollutant reduction capabilities. They range from relatively ineffective table-top units to larger, more powerful console units. In general, units containing either electronic air cleaners, negative ion generators, or pleated filters, and hybrid units containing combinations of these mechanisms, are more effective than flat filter units in removing ETS particles.

It should also be noted that although some air-cleaning devices may be effective at reducing ETS particles, many of the gaseous pollutants are not effectively reduced.[75] In addition, gases may be reemitted from tobacco smoke particles trapped by the air cleaner, since the particles are primarily liquid.[76]

Air Washing

Air washing is a process in which air is sprayed with water to increase its humidity. Some people report that washed air smells fresher than unwashed air, perhaps because some of the water-soluble particles in ETS are dissolved. As a result, washed air may need less ventilation to control tobacco odor. But washing does not significantly reduce the number of ETS particles in the air and its gaseous pollutants, so it is relatively ineffective for mitigating the health effects of ETS exposure.[77]

Time Separating Smokers and Nonsmokers

Time separation is a strategy that seeks to mitigate ETS exposure by having smokers and nonsmokers use the same space at different times. While this will reduce nonsmokers' acute exposure, it will not eliminate it because of the persistence of ETS. ETS particles cling to room surfaces and remain in the air for several hours after smoking has stopped. People entering a space where smoking occurred several hours earlier will often still be exposed to ETS particles and gases.

SIDEBAR

EXAMINING YOUR VENTILATION SYSTEM

The type of smoking policy you adopt may be influenced by the design of your ventilation system. Before you decide on a policy, talk to your landlord or building engineer to learn how the system works and how it can best meet your needs. Some things to look at are:

Ventilation zones. In a central ventilation system, air recirculates through all floors of a building: you breathe your neighbors' air. Can you create separate ventilation zones for your area?

Smoking room options. Are certain areas better suited for smoking rooms than others?

Requirements. Does your city or state have different ventilation requirements for smoking and nonsmoking spaces?

Cost. What would it cost to establish separately ventilated smoking rooms? What are the on-going energy costs of maintaining them?

Maintenance. To function properly, ventilation systems must be cleaned and serviced regularly. Is your system being adequately maintained?

CHAPTER 6: Regulating Smoking and ETS

A variety of regulatory controls have been developed dealing with ETS exposure. They include, federal regulations, state and local ordinances, and litigation.

The premise on which these controls are based is that all citizens have a "common law" right to a safe and healthy environment (common laws are unwritten laws whose binding power comes from their longstanding, universal acceptance). This implies an environment reasonably free from toxins. What happens when the common law right of nonsmokers to breathe clean air conflicts with the wishes of smokers to smoke in public?

The trend in legislation is toward giving precedence to the health of nonsmokersand to give higher priority to protecting nonsmokers from environmental tobacco smoke over smokers' preference to smoke.

At the same time, several legal opinions have indicated that smoking in public is not a protected legal right. This is not to say that smoking is illegal, but rather that it is a privilege that may be permitted or restricted in various settings.

FEDERAL REGULATIONS

Regulation of Tobacco and Tobacco Products

Some of the hazardous chemicals in ETS are regulated by government agencies when found in other contexts. For instance, benzene, DDT, arsenic, vinyl chloride, carbon monoxide, nitrogen oxide, radionuclides and lead are all regulated by EPA. The Food and Drug Administration regulates the nicotine in nicotine gum. The Occupational Safety and Health Administration (OSHA) also regulates 4-aminobiphenyl and 2-naphthylamine. Levels of all of these chemicals have been documented in ETS.[78]

However, tobacco and tobacco products have been largely exempted from federal regulation. The Tobacco Use in America Conference, sponsored by the American Medical Association, conducted a review of Federal regulation of tobacco products. The Final Report of the Conference observed that "Tobacco regulations are a haphazard patchwork of incomplete and diminishing control...the reasons for the lack of regulation are historical, economical and political -- not logical."[79]

Tobacco products are largely exempted from Federal regulation despite the fact that 43 constituents of tobacco smoke have been found to be carcinogenic in animals or humans. According to the National Academy of Sciences, **"cigarette smoke contains known human and animal carcinogens that would be strictly regulated if the source were something other than tobacco."**[80]

Smoking Restrictions in Public Transportation

While the federal government has not issued general regulations restricting smoking in public places, smoking has been restricted or eliminated on many forms of public transportation. Congress has banned smoking on all U.S. domestic airline flights of less than six hours, the Interstate Commerce Commission limits smoking on buses to the rear 30% of seats and Amtrak prohibits smoking on trains except in designated areas.

Smoking Restrictions in Federal Buildings

In 1986, the General Services Administration required all federal agencies to implement smoking control policies in their worksites. It developed standards that those policies must meet, but left the development of the policies to the individual agencies. The regulations vary from agency to agency.

STATE AND LOCAL ORDINANCES

Forty-three states[81] and 450 local communities[82] have adopted laws or regulations restricting smoking. While these laws vary, most address the following four areas: what smoking materials are included and where smoking may and may not take place; signage; who has the responsibility to enforce the regulations; and penalties for violating the regulations.

Where Smoking is Permitted

Most smoking control laws prohibit smoking in: public transportation vehicles, elevators, public waiting areas, health care facilities, libraries, museums, theaters, auditoriums, and swimming pools.

Many also prohibit smoking in: public schools, supermarkets, restaurants and department stores. Some include government offices. Some prohibit smoking in all enclosed public places except those listed in the ordinance. Generally exempted from the regulations are: bars, designated smoking areas of restaurants, private residences and hotel rooms.

An area where regulations vary greatly is the private workplace. Some ordinances make no mention of it; others require that employers provide smoke-free areas for nonsmoking employees to the greatest extent possible without incurring any expense. Some require all private employers to implement a smoking policy; others require employers to give the wishes of nonsmokers priority over those of smokers.

In general, most ordinances give precedence to nonsmokers when the preferences of smokers and nonsmokers collide. [83]

Signage Requirements

Many ordinances specify that signs must be posted prominently in all areas where smoking is restricted so people are aware of the regulations.

Enforcement

Enforcement of the regulations generally falls to the state or local health department. Owners of public property where restrictions apply are required to implement and enforce them on their premises. Failure to do so generally subjects the owner to penalties, frequently higher than those imposed on the offending smoker.

Penalty Provisions

Penalty provisions vary from state to state. The stiffest are in Minnesota, where people breaking the law are subject to a $500 fine or 90 days in jail. Colorado and Massachusetts impose no penalties at all. Other states charge fines of $5 to $200.

LITIGATION

A few individuals who felt they had not been adequately protected from ETS have sought relief through litigation. The small number of suits claiming damage from ETS in public places have been denied, generally on the grounds that individuals need not stay in a public place that causes them distress. However, suits brought by smoke-sensitive employees who must sit in smoke-filled offices each day have met with some success. Several dozen lawsuits have been filed on a variety of grounds, with mixed results.

Common-Law Suits

Several suits have claimed that employers were negligent in upholding an employee's common law right to a safe work environment. The first, and landmark, case was *Shimp v. New Jersey Bell Telephone*.[84] It was brought in 1976 by Donna Shimp, an employee of New Jersey Bell. According to her physicians, Shimp was allergic to cigarette smoke: her passive smoking caused severe nose, throat and eye irritation, headaches, nausea and vomiting. When Ms. Shimp used company grievance procedures to complain about the problem, the company installed an exhaust fan near her desk. When the fan didn't help, Ms. Shimp was invited to move to a different location, which entailed a demotion and a decrease in pay. After unsuccessfully seeking relief through several government agencies, Shimp sued the company for injunctive relief: she asked the court to require Bell to eliminate smoke from her work area.

The judge agreed. Noting "the toxic nature of cigarette smoke and its well known association with emphysema, lung cancer and heart disease," he concluded: "The evidence is clear and overwhelming. Cigarette smoke contaminates and pollutes the air, creating a health hazard not merely to the smoker but to all those around her who must rely upon the

same air supply. **The right of an individual to risk his or her own health does not include the right to jeopardize the health of those who must remain around him or her in order to properly perform the duties of their jobs**. The portion of the population which is especially sensitive to cigarette smoke is so significant that it is reasonable to expect an employer to foresee health consequences, and to impose upon him the duty to abate the hazard which causes the discomfort."

The judge also noted the irony that the company had already prohibited smoking around its machinery to prevent damage from tobacco smoke. He observed, "a company which has demonstrated such concern for its mechanical components should have at least as much concern for its human beings." He then ordered Bell to prohibit smoking in Shimp's work area.

By legally recognizing the dangers of cigarette smoke, *Shimp* established a precedent for future cases. However, this did not guarantee victory to future plaintiffs. In 1982, Paul Smith, an employee of Western Electric Company, suffered severe health effects from exposure to tobacco smoke at work. The company offered him an respirator or a job in the computer room (where smoking was prohibited) with a pay cut of $500 a month. He sued, and asked the court to require Western Electric to eliminate tobacco smoke from his work area. The trial court refused to hear the case. Smith appealed, and the Appeals Court, citing Shimp, ruled that "smoking in the work area is hazardous to the health of employees in general and plaintiff in particular." The Court stated that an injunction against smoking may be appropriate, and remanded the case to the trial court. The trial court, however, ruled in favor of Western Electric because it was not convinced that all of Smith's problems stemmed from ETS exposure. Smith did not appeal.[85]

A 1983 case, *Gordon v. Raven Systems & Research, Inc.*,[86] also handed the employee a defeat. Gordon, who claimed sensitivity to tobacco smoke, was terminated by Raven Systems & Research when she refused to work in a smoky room. She sued for monetary damages. The court recognized Gordon's sensitivity to ETS, but concluded that she had failed to present sufficient evidence proving its harmfulness to other employees, ruled that "the common law does not impose upon an employer the duty or burden to conform his workplace to the particular needs or sensitivities of an individual employee." Gordon lost her case. However, some lawyers believe rulings like Smith and Gordon may be less likely in the future given the evidence against ETS that has developed since the cases were heard.

In 1985, in the case of *Marie Lee v. (the Massachusetts) Department of Public Welfare* a state employee sued her employer to eliminate tobacco smoke from her work area. She was joined by a pregnant woman and an ex-smoker with emphysema. The court granted them a temporary order requiring the employer to prohibit smoking in their work areas. At that point a third party intervention was filed by a smoker who claimed that because she was addicted to tobacco, she would be unable to do her job if smoking were banned. The court dismissed the smoker's challenge as having no merit. An out-of-court settlement was negotiated providing full protection for the nonsmokers.[87]

"Handicapped Rights" Suits

Some smoke-sensitive employees have sued for relief under the **Federal Rehabilitation Act of 1973**. According to the Act, a "qualified handicapped individual" is entitled to "reasonable accomodation" for his or her disability. In two cases, employees claimed that sensitivity to tobacco smoke qualified them as disabled, and asked that smoke be eliminated from their worksites. In the case of *Pletten v. Department of the Army,*[88] the Merit Systems Protection Board ruled that Pletten was handicapped as a result of his smoke sensitivity, but that because he moved around during the day, the only effective way to eliminate smoke in his worksite would be to prohibit smoking throughout the facility. That, the Board felt, would be "undue hardship" for his employer. In the case of *Vickers v. Veterans Administration,*[89] the court held that Vickers was handicapped as a result of his smoke sensitivity, but that the employer had already made "reasonable accomodation" to his handicap by creating a separate smoking area and installing additional ventilation.

Although both plaintiff's requests were denied, these cases are important because they establish the precedent of nonsmokers qualifying as disabled under the Rehabilitation Act. The Act covers all federal employers, federal grant recipients, and federal contractees with contracts over $2,500.

Disability Retirement Suits

In 1982, Irene Parodi, who is asthmatic, was awarded disability retirement benefits by a federal appeals court because her employer, the federal government, had failed to provide a safe, smoke-free work environment. The court held that a person with an "environmental limitation"---that is, someone whose environment limits her ability to perform---can qualify for such benefits. In a settlement, the government paid Ms. Parodi $50,000 and granted her a civil service disability annuity.

This case established two precedents. First, a federal appeals court recognized that ETS in the workplace can prevent an otherwise normal and productive employee from performing his or her job. Second, it recognized that such an employee, in effect, becomes disabled and may be entitled to disability benefits.[90]

Workers Compensation Suits

In 1985, Marlene Richie, an administrative assistant in the Oregon State Executive Department, won her claim against the state in a Workers Compensation hearing. The ruling found that Ms. Richie had suffered a "bona fide occupational illness" because of ETS in the department's central offices. The order rejected the state's assertions that no compensation was due Ritchie because she was unusually sensitive to smoke and was a "chronic complainer" about her health. "She has reason to be a chronic complainer about her health owing to the fact that she actually is having health problems caused by on-the-job cigarette smoke," the hearing referee wrote in his opinion. Her unusual

sensitivity to smoke was not a valid argument against compensation, the referee held. "An employer takes an employee as the employee is found," he concluded.[91]

In 1980, Helen McCarthy left her job with the Washington State Department of Social and Health Services. After long-term exposure to ETS at work, she had developed chronic obstructive lung disease, and filed for Workers Compensation. The state rejected her claim, arguing that her disease was neither a work-related injury nor an occupational disease, the two situations compensible under Workers Compensation. McCarthy then sued her former employer for negligently failing to provide a safe and healthy workplace. The trial court dismissed the case, stating that employers are immune from suits under Workers Compensation. However, the Court of Appeals reversed that decision on the grounds that since McCarthy's injury was not covered by Workers Compensation, preventing her from suing her employer would unjustly deprive her of a remedy. The State of Washington appealed the verdict and the case went to the state Supreme Court. The high court unanimously confirmed the opinion of the Appeals court and again remanded the case to the trial court. McCarthy and the State of Washington reached a settlement shortly before the case was scheduled for trial.[92]

Unemployment Benefits

At least six states---New Jersey, Minnesota, Washington, California, Iowa and Idaho---have granted unemployment benefits to nonsmokers who quit their jobs because they were forced to work in smoke-filled offices.

SUITS BY SMOKERS

At the same time that some nonsmokers have found protection in the courts, several lawsuits have indicated that smoking in public is not a legally protected right. In 1982, Stanley and Elka Diefenthal, were denied seats in the smoking section of an airplane because the section was already full. They sued the Civil Aeronautics Board, claiming their right to smoke had been abridged. The trial court dismissed the case and the Diefenthals appealed. The Court of Appeals refuted their claim, stating that smoking sections on airplanes are created for the protection of nonsmokers, not the benefit of smokers.[93]

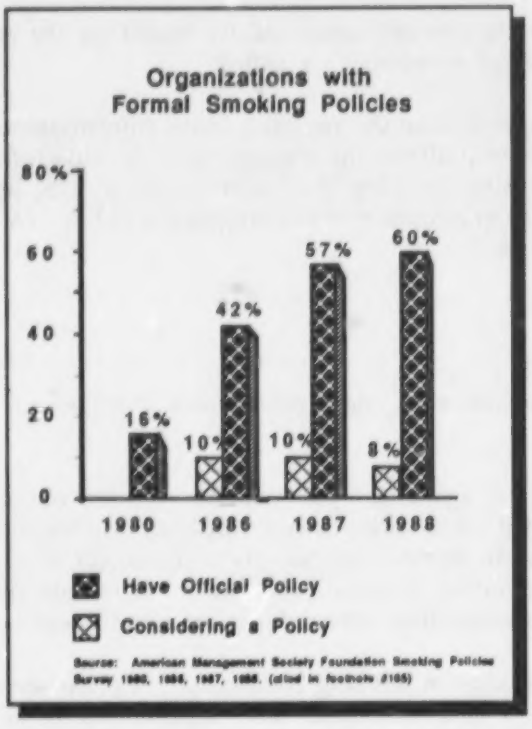
A few smokers have filed discrimination suits against employers who failed to hire them because they smoked. In Tulsa, Oklahoma, firefighter Grusendorf filed suit against the City when it prohibited smoking by firefighters on or off the job. He claimed the rule violated his constitutional rights of liberty and privacy. The Court upheld the City rule, finding that the fire department had a legitimate interest in the health of its employees.[94]

In a 1988 action, a job applicant in Minnesota claimed discrimination when an employer refused to hire him because he smoked. The employer argued that the smoker was undesirable because of his increased disability risk. The applicant appealed to the state Human Rights Commission which ruled that the employer's refusal to hire could fall within its definition of discrimination if it was based solely on concern about the

employee's disability risk. Refusals are not discriminatory if the employer can prove that the smoker's habit would impair his job performance or injure other employees. Because the applicant's job involved working alone, the employer could not make either of those claims. As a result, the Commission issued an executive order mandating that his application be accepted.[95]

CHAPTER 7: Developing Effective Smoking Policies

As concerns grow about the health effects of ETS, more organizations are implementing smoking control policies. A 1988 study by the American Management Society Foundation found that 60% of surveyed businesses had smoking policies in place and another 8% were currently considering a policy. This was up from the 16% of businesses that had policies in 1980. In addition the survey found that 25% of the businesses surveyed prohibited smoking at work. This was up from 14% in 1987.[96]



Organizations implement policies to respond to employee complaints, to comply with local legislation, to protect themselves from possible legal action and to reduce costs. Organizations with successful policies find that they require careful thought and planning. Who is involved in shaping the policy, how it is implemented, and the support given to smokers are elements critical to its success. Failure to carefully consider these factors can lead to policies that don't work. This chapter provides a brief overview of strategies for developing and implementing successful smoking control policies.[97]

A FIVE STEP PROCESS

Policy development and implementation is a five-step process. Attention to each step should produce a policy that is fair, well-received and comprehensive. The five steps are management review, situation analysis, strategic planning, implementation and evaluation.

Management Review

Goal:

- *to acquire information on the smoking issue and its impact on the organization and to garner management support for developing a policy*

To educate executive management on the smoking issue, information should be gathered on the smoking issue and how it affects the organization. Include information on employee complaints concerning smoking, the health effects of ETS, legal considerations, and the financial implications of adopting or not adopting a policy. (A list of resources appears at the end of this book.)

Situation Analysis

Goal:

- *to gather background information on the organization's attitudes and needs in relation to a smoking policy*

Once management has decided to pursue a policy, it should select and charge a Policy Development Team. This team will take primary responsibility for developing and implementing the policy. It can be made up entirely of managers, or can be an employee/management committee. It should include smokers, nonsmokers and ex-smokers, and union representatives, whenever labor unions will be involved.

Smoking policies, like any change in working conditions, are often seen as a mandatory subject of labor negotiation. Failure to include labor representatives in the policy development and implementation process has lead to litigation. Some courts have sided with unions, overturning the policy. Others have permitted policies to stand, citing the overriding health and safety concerns.

The first task of the Policy Development Team will be to gather data about the organization's needs and attitudes in relation to a smoking policy. Organizations often take the following steps: conduct an employee survey to assess employees' attitudes toward smoking in the workplace and toward possible restrictions; conduct a facilities survey to examine the building's ventilation system (and areas that could be used as designated smoking rooms), and review existing policies to see which might be affected by smoking restrictions (e.g. break policies, hiring policies, discipline policies and employee benefits).

Strategic Planning

Goal:
• *to define the smoking policy*

Where smoking is permitted is only one aspect of a policy. Many other considerations must also be addressed:

- how will employees be educated about the policy?
- will stop-smoking classes be provided?
- will the company pay for the stop-smoking classes?
- how will the policy be enforced?
- how will policy violations be handled?
- will the new smoking policy impact hiring and break policies?
- will smoking be permitted in company vehicles?
- will it be permitted by visitors?
- will cigarette machines be allowed on company property?
- what will the signage needs be for the new policy?

In reviewing policy options, the Team should also talk to organizations and individuals that have successfully implemented workplace smoking policies in order to learn from their experiences.

Implementation

Goal:
• *to implement the policy smoothly, with minimum disruption and maximum employee support*

Successful policies begin with carefully planned announcements. Explain the reasons for the policy as well as its stipulations. Make sure employees understand that this is a health and safety issue, not a crusade.

Announce the policy 90 days before it is to take effect. The 90 days between the policy's announcement and its inauguration are critical. Use this time to educate employees and to provide support to smokers. This will also give employees time to adjust and express their concerns.

Organizations have successfully used employee newsletters, seminars, question and answer sessions, telephone hotlines, and no-smoking signs to tell employees about the new rules, about cessation programs, and about how to get more information. Present the policy as a "win/win" effort. Don't pit smokers against nonsmokers. For the policy to succeed, it must be seen as benefitting the whole organization, not one group. Top management should be vocal in its support of the policy.

Offer mechanisms for employees to comment on the policy. Train managers in responding to the comments. Also make a special effort to listen to smokers. Get them involved in creating designated smoking areas and planning cessation programs. Many smokers will use the policy as an incentive to quit. Cessation programs help them with this goal and promote acceptance of the policy.

Evaluation

Once the policy is implemented, the Policy Development Team, along with other employees as needed, should conduct a comprehensive evaluation. The review should review the following questions:

- how was the policy received by both smokers and nonsmokers?
- were there policy violations? If so, how were they handled?
- how was the employee education campaign received?
- how many employees enrolled in smoking cessation programs?
- how many employees quit smoking or reduced their smoking level?
- has the organization reviewed the cost containment possibilities created by the new smoking policy?

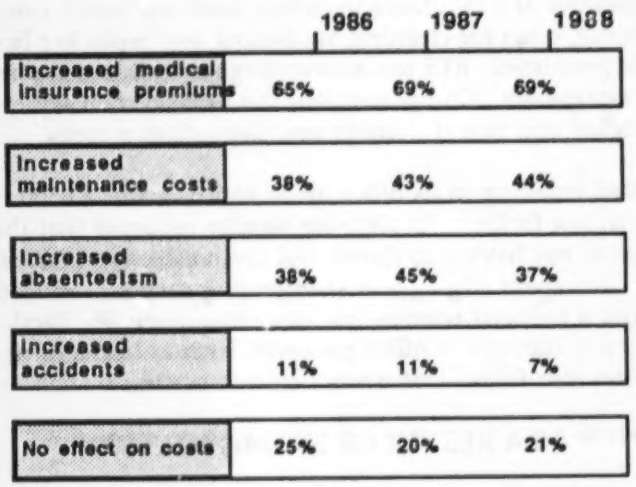
CHAPTER 8: Cost Savings Related to ETS Reduction

The Office of Smoking and Health in its 1990 Report to Congress reviewed the annual financial impact of tobacco use and reported, "the total economic impact for all 50 States was over $52 billion: $23.7 billion in direct morbidity (illness) costs, $10.2 billion in indirect morbidity costs, and $18.5 billion in indirect mortality costs." The report concluded that "with the sum of State economic costs exceeding $52 billion, the economic impact of smoking can be put at some $221 per person each year. Thus cigarette smoking has an economic impact on every American, whether or not he or she smokes."[98]

The exact contribution of ETS to the overall economic impact of smoking has not been determined. There has been relatively little research in this area and most of the studies that have been conducted only minimally document the direct and indirect costs of ETS. Rather, the studies review the excess costs borne by companies as a result of having smokers on the payroll.[99,100,101,102,103,104,105,106,107]

A recent study of business executives asked if smoking increased costs for their companies. 69% of the executives surveyed felt that smoking increased medical and insurance premiums, 44% felt that smoking increased maintenance costs, and 37% responded that smoking increased absenteeism costs. 21% of those surveyed responded that smoking had no effect on their company's costs.[108]

Impact of Smoking on Company Costs



Source: American Society Foundation Smoking Policies Survey 1986, 1987, 1988. (cited in footnote #117)

This chapter will summarize what is known about the costs attributed to ETS and about possible cost savings as a result of ETS reduction. Much of the information in this chapter is self-reported by organizations, or anecdotal. More research is needed to quantify if, and where, cost savings are possible related to ETS.

DIRECT COST SAVINGS AS A RESULT OF ETS REDUCTION

When smoking takes place inside a facility, ETS can have a direct impact on the health and productivity of nonsmokers and the maintenance of equipment and furnishings.

Nonsmoker Health and Productivity

Nonsmokers regularly exposed to ETS can experience a variety of impairments, from mild irritation to cancer. At the low end, these impairments can reduce a worker's productivity or cause absenteeism; at the high end, they can produce large medical or legal claims.

Pacific Northwest Bell prohibited smoking in its facilities in 1985 (its case study appears in chapter 10). Following the implementation of its policy, the company documented savings in health care costs. These included a 13% decrease in clinic visits for respiratory problems, a 20% drop in respiratory- related absences lasting three days or more and a decrease in clinic visits for headaches and sinus problems. Pacific Northwest Bell attributes a substantial amount of these savings to the improvement in air quality based on its smoke-free policy.

Maintenance and Repair

As discussed earlier, components of ETS adhere to indoor surfaces, which can cause them to discolor and smell. As a result, costs for cleaning, repainting and replacing furnishings can be higher when smoking is permitted. ETS can also damage sensitive equipment, such as computers and laboratory equipment. Companies that fail to keep their equipment free of ETS, therefore, can have higher equipment damage and depreciation costs.

Unigard Insurance prohibited smoking in its office areas and received a $500 monthly discount in janitorial costs in one facility. Its cleaning vendor reported that there were significant time savings due to not having to dump and clean ashtrays, reduced time dusting desktops, reduced time spent edging and shampooing carpets, reduced maintenance on upholstered furniture and a reduced window cleaning frequency.[109] Pacific Northwest Bell also reported a reduction in damage to office property, such as burns in rugs and upholstery. The organization also found that overall cleanliness in its facilities improved.

INDIRECT COST SAVINGS AS A RESULT OF ETS MITIGATION

The Surgeon General's 1986 report observed that "a stringent smoking policy can decrease the number of smokers within an organization." Companies that implement policies report that this is the case. Pacific Northwest Bell found that following the introduction of its

smoking policy, almost 25% of its smokers quit smoking and 61% of the remaining smokers report that they now smoke less. Reducing the number of smokers or eliminating smoking entirely can result in lowered costs to a company in each of the following areas.

Fire and Accident Insurance

Organizations that prohibit smoking can bargain for lower fire and accident insurance premiums. Research shows that smokers are more likely than nonsmokers to be involved in fires[110] and up to twice as likely as nonsmokers to be involved in accidents.[111] As a result, fire and accident insurance premiums where smokers are present can be higher.

Group Health and Disability Insurance; Productivity and Absenteeism

Insurance companies frequently offer discounts on individual health insurance policies to nonsmokers. Similar discounts are now beginning to be offered to group policy holders as well. Because implementation of a smoking policy in a business generally results in a reduced number of smokers on the payroll, this can result in lower health insurance premiums. King County Medical Blue Shield of Washington offers up to a 15% discount in health insurance costs to organizations that prohibit smoking and have fewer than 10% smoking employees. (They have also agreed to pay for 75 percent of the cost of smoking cessation programs for subscribers.)

Discounts are also available in disability insurance premiums. Nonsmoker discounts range from 3 to 14%, with the industry average at 8%. Some insurance providers impose a surcharge on smokers. The average smoker surcharge varies from 10 to 14%, with the industry average at 13%.

The effects of smoking on absenteeism have also been documented. Repeated studies have shown a 33% to 45% greater absenteeism rate among smokers than nonsmokers.[112] In 1979, the Surgeon General reported that 81 million work days are lost per year due to smoking.[113] This works out to approximately two days per smoker.

Studies show that smokers lose work time to the smoking ritual as well as to minor smoking related impairments, such as reduced attentiveness. Estimates of productive time lost vary from eight[114] to 55[115] minutes a day.

The 1986 Surgeon General's report stated that "it is generally agreed that employees who smoke cost their employers more than nonsmoking employees because of excess absenteeism, increased health care utilization, and reduced productivity. This leads to greater use of sickness, disability and health care benefits and ultimately higher health insurance costs to business."[116]

This was borne out in a study which compared health care utilization differences between tobacco users and people who did not use tobacco in a large group insurance plan. The study found that tobacco users had more hospital admissions (124 vs. 76), more total days in

the hospital (800 vs. 381), a higher average length of stay (6.47 vs. 5.03 days), higher average outpatient payments ($122 vs. $75), and a higher average of overall payments ($1145 vs. $762). The authors of this study did observe tobacco use is correlated with other high risk behaviors, therefore, cost and utilization differences may not be based solely on tobacco use.[117]

The correlation between tobacco use and higher health care utilization and higher health care costs was corroborated by a study at Pacific Bell, which found that the annual health related costs (disability, absence, and health) of smokers averaged $593 more than the same costs for nonsmokers.[118]

CHAPTER 9: Public Attitudes Towards ETS

Surveys of public attitudes about smoking have been done since 1964. They have been performed by major national polling organizations (the Roper Organization, Gallup Polls, and Louis Harris and Associates) for the U.S. Office on Smoking and Health, the American Lung Association, the American Cancer Society, the American Medical Association, the Tobacco Institute, and other groups.

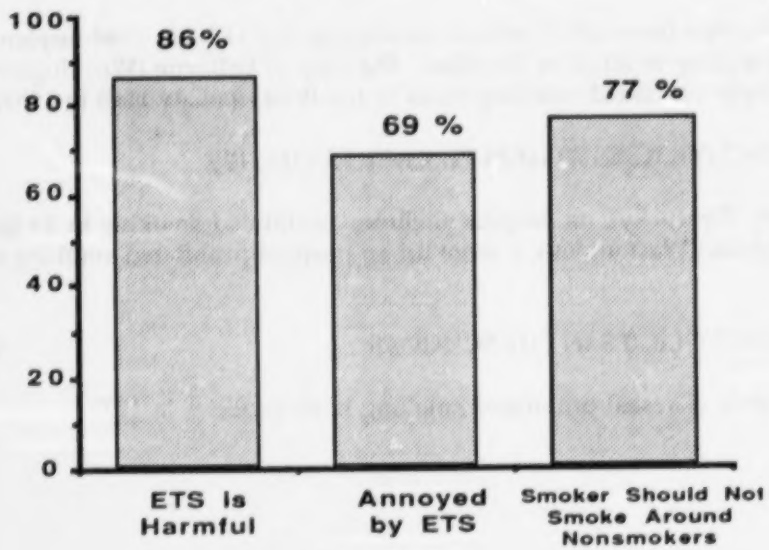
Regardless of sponsor, the polls show consistent results. They reflect increasing public concern about the dangers of ETS, and increasing approval of restrictions on smoking in public places and the workplace. These increases occur for both smokers and nonsmokers. The Surgeon General's report observed that changes in attitudes about smoking in public appear to have preceded legislation, but the interrelationship of smoking attitudes, behavior and legislation are complex.

Public perceptions about risk and the degree of acceptance of restrictive measures has a profound impact on the technical aspects of mitigation strategies. Therefore a series of key findings from public opinion polls are included.

The following chart summarize the results of some of these surveys.

Public Attitudes Toward ETS

What American Smokers and Nonsmokers Believe



Source: American Lung Association / Gallup Survey 1989

PART III

CASE STUDIES

The following chapters profile smoking policies in a variety of organizations and settings. Each case study examines a policy's development, implementation and evaluation. All of the policies described have been in effect for at least three years.

Across all the case studies, certain factors stand out as critical to a policy's success. These include: demonstrated support for the policy by executive management, establishment of an indoor or outdoor designated smoking area, development of a mechanism for gathering employee feedback, implementation of a comprehensive employee education effort, introduction of stop-smoking programs for smoking employees, participation of labor in policy development and implementation, and development of a policy that applies equally to all employees.

Chapter 10: SMOKING POLICIES IN THE PRIVATE WORKPLACE

Pacific Northwest Bell (facilities in Washington, Oregon and Idaho) implemented a policy prohibiting smoking in its facilities in 1985.
Honeywell Corporation (Minnesota) established separately ventilated designated smoking rooms in its Minneapolis-area facilities in 1987.

Chapter 11: SMOKING POLICIES IN GOVERNMENT FACILITIES

The Indian Health Service (over 200 locations throughout the U.S.) in 1984 implemented a policy prohibiting smoking in all of its facilities. The City of Bellevue (Washington) established a separately ventilated smoking room in the Bellevue City Hall in 1985.

Chapter 12: SMOKING POLICIES IN HEALTH CARE FACILITIES

The Lexington Clinic (Kentucky), an outpatient clinic, prohibited smoking in its facilities in 1987. Swedish Hospital (Washington), a large urban hospital prohibited smoking in its facilities in 1985.

Chapter 13: SMOKING POLICIES IN THE SCHOOLS

Andover Public Schools (Kansas) prohibited smoking in its facilities in 1978.

CHAPTER 10: Smoking Policies in the Private Workplace

According to the Surgeon General, for adults living in a household where no one smokes, the workplace is the greatest source of exposure to ETS.[119] However, several concerns make some private employers reluctant to institute smoking policies:

Angering Employees

Many managers fear that adopting a smoking policy will create dissension in the company and cause employees to leave. However, studies of companies that have implemented policies show that employees often favor the clarity that a smoking policy will provide and that smoking employees generally lose their resentment within the first few months.

Enforcement

Many managers are concerned about having to punish smoking policy violators. However, companies that have implemented policies report few cases of discipline involving employees smoking at work. Smoking policies seem to be largely self-enforcing, with employees reminding violators of the rules.

Labor Unions

Some companies assume that their unions will automatically oppose smoking restrictions. However, many organizations find that when unions are involved in developing a policy, they can be counted among the policy's supporters. Smoking policies are widely seen as a subject of mandatory negotiation, so labor should be included in their development.

This chapter profiles two corporations that implemented different kinds of policies. Pacific Northwest Bell prohibited smoking entirely. Honeywell established designated smoking rooms in its corporate headquarters.

PACIFIC NORTHWEST BELL, SEATTLE, WASHINGTON

- **Smoking Prohibition**

BACKGROUND

Pacific Northwest Bell (PNB) is the telecommunications company serving Washington, Oregon and Idaho. Now known by the name of its parent company, U.S. West Communications, the company employs 15,000 people in over 750 separate buildings. Among its facilities it counts business offices, substations, central switching offices, computer centers, construction and vehicle garages, and its 32-floor headquarters building in downtown Seattle. PNB employees include linemen, computer technicians, mobile

service representatives, mechanics, operators and office personnel. This broad range of facilities and employees all had to be accomodated in the company's smoking policy.

THE POLICY DEVELOPMENT PROCESS

PNB first began considering a smoking policy in 1983. The primary impetus was employee complaints. The president, as well as health and safety officers, received frequent letters from nonsmokers objecting to co-workers' tobacco smoke. Because of the growing awareness of the dangers of ETS, the company was sensitive to these objections. Local clean air legislation and press coverage also fed their concern for employee safety. To examine the issue, management convened a Smoking Issues Steering Committee. Comprised of company and union representatives, smokers, nonsmokers and ex-smokers, the committee was charged with "exploring alternatives and recommending a policy that was fair and equitable to all employees."[120 121] Over the next two-and-a-half years, the committee gathered information and studied different approaches to limiting ETS in the workplace.

The committee began by surveying employees. Through an employee questionnaire, they polled workers on their feelings about smoking on the job and at home, their smoking status, and their grasp of the issue. The survey revealed that 26% of employees smoked cigarettes (an additional 2% smoked pipes or cigars) and that employees harbored strong dissatisfaction with existing smoking conditions. For example, 82% of nonsmokers indicated they had occasionally been bothered by someone else's smoke. The survey results reinforced the company's decision to develop a policy; in fact, PNB immediately reduced the smoking area in all its cafeterias from 70% to 35%, better reflecting the proportion of smokers. At the same time, they designated all their conference and training rooms nonsmoking.

Next the committee reviewed the city, county and municipal ordinances regulating indoor air in the three states in which they operate. The regulations varied. To meet them, the company felt it needed a simple, but comprehensive policy. To generate some policy alternatives, they reviewed the smoking policies of other corporations.

Then the committee turned its attention to company buildings. After conducting a facilities survey, they found that existing ventilation systems were inadequate to meet the needs of smoking areas. Retrofitting the systems would cost between $5,000 and $80,000 per room, a prohibitive amount considering the large number of PNB buildings. That finding had a strong effect on steering the company toward a smoking prohibition.

PNB knew that labor union support of its policy would be crucial. More than two-thirds of the employees belong to either the Communications Workers of America or the Order of Repeatermen and Toll Testboardmen. Without the unions' support, the company would have had implementation and enforcement problems. To avoid these, they involved union representatives in shaping the policy. The unions, representing both smokers and nonsmokers, were in a difficult position. Taking a stand on either side would mean potentially angering members. To avoid this, they each took a neutral stand on the policy.

However, they had strong feelings about certain aspects of the policy that would affect all their members, regardless of smoking status. They felt that in order to be fair, the policy needed to be completely non-discriminatory: if one area was to be nonsmoking, all should be. They also felt that if the company were going to require smokers to restrict their smoking, management should pay for smoking cessation programs for employees, spouses and dependents. As a result of the discussions, the company agreed to union requests, and the unions agreed not to support grievances filed by individual employees.

As the committee gathered input and reviewed options, the company allowed individual work groups to test their own solutions. Groups tried a variety of approaches. Some voted on whether to permit smoking in their area: that left many workers feeling outvoted and unhappy. Others permitted smoking only during certain hours: that failed when smoke from a work group next door drifted into their area. Some decided to go smoke-free, but unknowing smokers would walk through their area, arousing a hostile reaction. Others asked smokers to cut back: that peeved smokers without satisfying nonsmokers. Every alternative had drawbacks and the company continued to get complaints. As they weighed the advantages and disadvantages of each, the scale tipped decisively in favor of a facility-wide prohibition.

One week before announcing the policy, the committee presented it to employee focus groups. The groups voiced the greatest concern about company commitment and enforcement. As a result, a memorandum was issued to all directors, asking that they let subordinates know that all officers---including PNB's president---were totally committed to the ban. Then, on July 15, 1985, two-and-a-half years after the Steering Committee first convened, a memorandum was sent to all employees. It said, **"to protect the health of PNB employees, there will be no smoking in any company facility."** Three months later the policy went into effect.

IMPLEMENTATION

Concurrent with the announcement of the ban, PNB began an employee education program explaining the health effects of ETS and the reasons for the policy. The effort included the company newsletter, its in-house health and safety magazine and a telephone "hotline" employees could call with questions or comments.

At the same time the company agreed to reimburse employees, spouses and dependents who attended a cessation program from an approved list. Individuals were free to choose the type of program that would work best for them, a choice which appeared to increase their commitment to succeed. As a result of the program, 1,541 employees signed up for classes. Forty percent were still not smoking after a year, and the percentage of smoking employees dropped from 28% to 20%. In a recent survey evaluating the prevalence of cigarette smoking, 66% of smoking respondents said it had helped them cut down or quit. The average smoker had smoked more than 20 years before entering the program, and had tried to quit approximately five times. The majority of ex-smokers say they feel healthier

since they stopped smoking and that the work environment has improved since policy implementation.

EVALUATION

According to a company spokesman, the smoking policy is "one of the most successful policies PNB has ever implemented." Enforcement has not been a problem: only one employee violated the policy and received a verbal warning, as part of PNB's normal progressive discipline program (verbal warning, written warning, suspension and termination). Today headquarters employees, who work in one of the taller buildings in Seattle, are well-known for having to go down as many as 32 flights and out the door when they want a cigarette.

PNB recently completed a follow-up study on its smoking policy. They conducted a random sample of 1800 employees with a survey response rate of 89%. The employees were asked how they felt about the ban on smoking inside company facilities. Seventy percent responded that the policy was "about right", 18% said the policy was "not strict enough", and 12% reported that the policy was "too strict". The company reports that 60% of the current smokers agreed that the ban on smoking in company facilities was "about right". The company also asked employees about the harmfulness of ETS. Ninety-one percent of the employees called ETS "definitely or probably harmful", 3% called it "definitely or probably not harmful", and 6% responded that they "don't know or are not sure".

PNB knew that implementing a policy would cost money, but decided early on that they would rather "invest" that money in employee health than pay the on-going expense of permitting smoking. After implementing the policy, they systematically measured its financial impact, and found that it produced substantial cost savings: there are now 13% fewer visits to company clinics for respiratory problems; there has been a 20% drop in respiratory-related absences lasting three days or more (this equals a cost savings for incidental and disability absences of $111,000) and visits to clinics for headaches and sinus problems are down. Savings on health insurance are difficult to measure because of the large number of contributing factors, but based on these statistics the company believes them to be substantial. In addition, damage to office property, such as burns in rugs and upholstery, has decreased, and overall cleanliness has improved.

Offsetting these savings, PNB spent an average of $145 per smoker---less than $250,000---on cessation classes. They contrast this with the much greater sum it would have cost to re-ventilate their 750 buildings, and feel they made a wise economic choice to implement a smoking prohibition.

In fact, they could have reduced their cessation costs further. In their eagerness to provide customized classes, they offered a wide array of programs. Some (hypnosis and acupuncture) were less effective than others (group and individual support sessions, and doctor-prescribed programs). Had the company limited the cessation options, they might

have steered employees to more effective programs and negotiated discounts with program suppliers.

In evaluating its policy, PNB emphasizes the following points:

PNB's significant employee and union involvement in shaping the policy played a key role in gaining employee support for the policy.

The comprehensive and free smoking cessation program for employees, spouses and dependents played an important role in getting smokers' support for the policy.

HONEYWELL CORPORATION

- **Separately ventilated smoking rooms**

BACKGROUND

Honeywell Inc., manufacturer of electronics equipment, employs 56,000 people in its 22 U.S. divisions. The company owns or leases over 400 buildings, including its large corporate headquarters in Minneapolis, branch offices around the country, and several major manufacturing plants. Approximately 40% of its facilities are in the Minneapolis area.

THE POLICY DEVELOPMENT PROCESS

Honeywell first developed a smoking policy in response to Minnesota's new Clean Indoor Air Act. The company asked its divisions nationwide to implement policies regulating smoking. They were to follow the guidelines of the Act and create, at a minimum, designated smoking areas. In response, some set up smoking lounges; others permitted smoking everywhere except in designated no-smoking areas. Most company cafeterias were divided into smoking and no-smoking sections. The company did not recommend enforcement provisions, and therefore, few divisions had them.

However, as information about ETS grew, employee complaints persisted. Many people worked in open offices in which smoking and nonsmoking sections were side by side. Others worked in nonsmoking areas that adjoined closed smoking rooms from which some smoke escaped. In response to employee concerns divisions gradually tightened their policies.

An employee survey was conducted through Honeywell's in-house publication. It asked if employees favored increased smoking restrictions and 75% said they favored the same level or greater restrictions. This resulted in a policy to move closer to a smoke free environment. Smoking was banned from conference rooms, offices and common areas.

This approach resulted in both positive and negative feedback from employees and management. It was decided that the Minneapolis-area operation would develop a

uniform policy for their facilities. Out-of-town divisions were asked to develop and refine their own policies to best meet their needs.

The task of developing the Minneapolis-area policy was given to the Human Resources directors of those divisions. This group met for almost a year, talking with union representatives and examining policy options. Finally, the committee decided on a policy that would ban smoking from Honeywell buildings and grounds.

IMPLEMENTATION

To ease the transition for smokers, management decided to implement the policy gradually. Three to four months before the policy was to take effect, it was announced in the company newsletter. Also announced was a "phase-in" period during which the policy would be in effect but would carry no penalties. Several months later, in response to considerable employee concern, the company rescinded the total ban, and created "temporary" smoking rooms in each building while they re-exmained the policy. Free on-site smoking cessation programs were already being offered both on and off hours.

After several more months of deliberations, a revised policy was issued for Minneapolis operations. **Honeywell decided to retain the designated smoking rooms as a reasonable accommodation for all concerned.** This time violation penalties were specified; enforcement would be handled by department managers; penalties would follow usual disciplinary procedures including reprimands, demerits, verbal and written warnings, and possible termination.

To accomodate the large amounts of smoke, ventilation in the smoking rooms was modified. Each room was vented directly to the outside; exhaust fans and air cleaners were added. The cost of the changes in ventilation was estimated to be a few thousand dollars per room.

EVALUATION

The new policy is considered successful. 99% of employee smoking occurs in the smoking rooms, with smokers occasionally reminded by co-workers not to smoke elsewhere. Most infractions occur on weekends or evenings when the offices are largely empty. Nonsmokers occasionally complain that smokers get extra break time, but most of the early discomfort with the policy has quieted down.

The smoking lounges seem to meet the needs of smokers, although they generate occasional complaints from nonsmokers. When large numbers of smokers are present, smoke escapes from some of the rooms through the doorway. Workers in adjacent offices have complained, and in the corporate headquarters building, extra doors were added to one smoking room to minimize such leaks.

Today, Honeywell feels it has learned valuable lessons in policy development, and is pleased to have a smoking policy it considers successful. Many of the out-of-town divisions also have implemented a policy in keeping with their local needs and environment.

In evaluating its policy, Honeywell emphasizes the following points:

Honeywell could have paid closer attention to the needs of smokers.

It should have demonstrated strong management commitment to the policy from the start.

CHAPTER 11: Smoking Policies in Government Facilities

The 16 million Americans employed by federal, state and local governments are subject to widely different smoking regulations. While some government agencies prohibit smoking entirely, many restrict it to designated areas and some have no regulations at all. Increasing numbers of agencies are implementing or making smoking policies more stringent. However, some agencies hesitate to tackle the issue because of the following concerns:

Occupational Variety

Within one government agency, the range of occupations -- and work environments -- can be huge. A small city government, for example, may include offices, hospitals, vehicles, waste facilities, fire stations, public transportation facilities, an airport, and other disparate sites. Developing a policy that meets the needs of each site can seem formidable. However, governments have found that when a policy is developed with input from everyone affected, it can be implemented smoothly and successfully.

Labor Unions

Labor contracts in government can have weaker management rights sections than those in private business. This can weaken management's position in negotiating a policy. Government agencies have avoided this problem by bringing unions into the policy development process early on as a partner.

Layered Decision-Making

Government agencies tend to have slow, layered decision-making processes that can hamper the development and implementation of new policies. Governments have streamlined this process by treating smoking policies not as political issues, but as internal personnel issues.

This chapter profiles the policy development process in two government organizations. The Indian Health Service prohibits smoking in all of its facilities. The City of Bellevue created an enclosed, separately-ventilated, designated smoking room.

INDIAN HEALTH SERVICE[122]

- **Smoking Prohibition**

BACKGROUND

The Indian Health Service (IHS) is the primary health care provider for approximately one million Native Americans. Its facilities include 11 area offices, 43 hospitals, 66 health centers, and over 100 health stations and satellite clinics throughout the United States.

THE POLICY DEVELOPMENT PROCESS

In 1983, IHS doctors and administrators began to consider restr[illegible]ng smoking. Their reason was simple: they wanted to reduce the number of Indians who [illegible]moke. They were supported in this goal by Indian tribal leaders as well as by Surgeon General Koop who helped them map a strategy. Together they developed the goal of a Smoke Free IHS.

To develop the policy, they formed a Smoke-Free Task Force. The 18 member committee included administrators, doctors and nurses; Indians and non-Indians; smokers, nonsmokers and ex-smokers. The Indian representatives were adamant: they would support a policy only if it were equitable, that is, if it applied equally to Indians and non-Indians. That meant administrators, doctors, nurses, janitors, food service workers, patients... everyone working in or using the facilities would have to be equally restricted. **There could be no smoking in private offices, in conference rooms, or in any other areas off-limit to Indian patients. In effect, the Indian representatives would support only a total prohibition of smoking in IHS facilities.**

80 to 90% of the clinical care providers of IHS welcomed this as good news. They too favored a ban. IHS leadership; administrators, physicians, nurses, pharmacists, etc., had long recognized the great importance of disease prevention, if the limited annual budget were to make inroads against the extensive health problems of Native Americans. Smoking control was essential in disease prevention.

Unlike some other hospital systems where nurses, many of whom smoked, had been reported as a group to tend to offer resistance to smoking control, the Native American Nurses Association was one of the first groups to offer support for a total smoking ban. IHS encouraged this nursing leadership by giving early key roles in the policy planning and development to nurses and saw to it that later recognition and credit was given to the nurses.

IMPLEMENTATION

The task force decided that implementation would be handled autonomously by individual IHS facilities. As a result, implementation was uneven. Some facilities implemented the ban immediately. Others phased it in over two years, first restricting smoking to a few areas, eventually banning it altogether. In some facilities, staff and patients were extensively educated through memos, newsletters and presentations at which employees could ask questions and voice concerns. In others, education was left to the announcement memo and signage. Implementation was delayed the longest in a handful of the 200 facilities where there were weaker education programs and where staff felt their concerns were not addressed.

In contrast with the strong general support from clinicians, the non-clinical care employees, such as laboratory and maintenance equipment/store room employees tended to be less appreciative of preventive health measures and were less supportive as a group. Most local

community union members were supportive. Of the 19 unions representing IHS employees in 25 states, 17 were involved in the early discussions for planning, development and implementation of the new smoking control policies. However, in two instances where local hospital administrators did not follow IHS leadership instruction for proper involvement of the unions, there was a challenge by local unions.

In one of these instances (Tahlequah, Oklahoma) a union grievance was taken through Federal Court to the U.S. Federal Labor Relations Authority, September 1986. This was one year after the hospital and the IHS had already successfully implemented their smoking bans at 200 facilities in 25 states on a system-wide basis.

The Federal Judge's ruling dated July 23, 1987 dismissed the union grievance as without validity. However, an appeal by the union has resulted in a 1990 reversal of the 1987 ruling to say that the IHS local facility at Talhequah, Oklahoma was in error in not negotiating with the union before implementing the smoking ban as a "fait accompi." In response to this ruling, the Department of Health and Human Services of the U.S. Government, as the department responsible for the Indian Health Service, has pointed out that IHS failure to properly negotiate in advance with the union at the one facility mentioned is of no current relevance at this time since the U.S. Government General Service Administration (GSA) smoking policy has since been updated to allow total smoking bans at the discretion of the U.S. Government Agency Heads. The U.S. Department of Health and Human Services has established total smoking prohibitions at all of its facilities, including the IHS.[136]

In most facilities, IHS gave employees time off to attend smoking cessation programs and offered nicotine gum to those who wanted it. The labor unions also made these available to their members.

EVALUATION

Overall, IHS feels reaction to the ban was positive. The majority of complaints came from smoking staff members and these subsided after the first several months. Few patients complained, and compliance to the prohibition has been good. In evaluating its policy, the Indian Health Service emphasizes the following points:

IIn addition to strong top leadership, there must be significant early employee and staff participation and involvement. In some facilities, IHS could have done a better job of involving the unions in developing and communicating the policy to employees.

The strong support of employees and the fact that the policy applied equally to all was the key to the success of the policy.

CITY OF BELLEVUE, WASHINGTON

- **Separately ventilated smoking room**

BACKGROUND

Bellevue, with a population of 85,000, lies just across Lake Washington from Seattle. A suburb in the 1960s, it has since become the fourth largest city in the state, boasting branches of many national corporations and a burgeoning downtown skyline. Bellevue's 11 government departments are headquartered in City Hall. Other facilities include sewage treatment plants, mechanical barns, maintenance sheds, parks, a community college, fire stations, other buildings and vehicles. Five unions represent a third of the city's 900 employee workforce.

THE POLICY DEVELOPMENT PROCESS

By 1985 Bellevue already had developed a simple and successful smoking policy for city vehicles: nonsmokers prevail. But that year, a group of nonsmoking employees in City Hall complained about tobacco smoke at their desks. They took their grievance to the Employee Committee, a standing committee of elected and appointed employee representatives charged with handling personnel matters, and the Committee created a Smoking Policy Committee, made up of smokers, nonsmokers and ex-smokers to explore the issue.

The Committee knew that its policy would have to work in every city facility, and in unionized departments with different working conditions. To smooth the process, they invited representatives from the five unions to work with them. They researched the health effects of ETS, discussed policy options, and outlined a strategy. The first step was an employee survey to document smoking preferences and attitudes. The survey revealed that only 19% of employees smoked, that over 70% felt tobacco smoke was a problem, and suggested that the workforce would more strongly support designated smoking rooms than a ban.

Concurrent with the survey, presentations were scheduled for all employees. The presentation explained that the City was considering a policy, explained the reasons why, covered the health effects of ETS, and solicited reactions from the employees. Smokers and nonsmokers were able to air their concerns as well as ideas for solutions. The presentations were instrumental in developing support for the policy because all sides felt their views were heard.

Since employee opinion strongly favored designated smoking rooms, the City examined that option with a ventilation engineer. Fortuitously, at that time, the City Hall lobby was being renovated, and for under $5,000 **the City of Bellevue created a smoking lounge with separate ventilation in the City Hall**. This would satisfy City Hall employees.

A smaller number of employees worked outside City Hall. These workers (police, firefighters, sanitation workers, utilities workers, mechanics, etc.) had greater mobility than those in City Hall, and agreed that separate smoking rooms were unnecessary: they could easily smoke outside.

With that decision the policy was determined: smoking would be prohibited except in designated smoking areas. In buildings with no designated area, smoking would be restricted to outside.

IMPLEMENTATION

Three months before it was to begin, the City announced the policy with employee newsletters and bulletins. They explained the role of employee input in shaping the policy and invited comment. Concurrently, they offered free smoking cessation classes to all who wanted them. Approximately a third of the smokers participated, and many of those quit smoking. Because the City Hall smoking lounge was not ready when the policy took effect, the City temporarily designated a portion of the lunch room as a smoking area; a few months later, the permanent lounge was opened.

Shortly after the policy was announced, the attorney for the Police Guild argued that it represented an unfair change in working conditions. But Guild leadership, satisfied with the policy, refused to make an issue of it.

EVALUATION

Overall, reaction to the policy was good. Some employees complained in the first few months, but grievances gradually tapered off and stopped. City managers had been concerned that unhappy smokers would defy the policy by smoking in secret, but only one employee did so. Despite "no smoking" signs, visitors occasionally light up in the building, but always stop smoking when asked. A second City concern, that smokers taking breaks in the lounge would suffer a decline in productivity, did not materialize.

In evaluating its policy, the City of Bellevue emphasizes the following points:

The City of Bellevue's maximized employee participation in policy development.

The City established an adequately-ventilated, designated smoking room.

CHAPTER 12: Smoking Policies in Health Care Facilities

The reasons to establish smoking policies in health care facilities are clear: patients are particularly susceptible to injury from ETS, and, surrounded by flammable materials, patients smoking in bed are a safety risk to themselves and others (the American Hospital Association has stated that 66% of all hospital fires are caused by smoking). Many health care facilities have successfully implemented policies. However, some hesitate to do so because of the following concerns:

Patients Who Smoke

Nicotine is addictive, just like heroin or cocaine. Patients who smoke may not be able to stop, regardless of their health. Many hospitals have alleviated this problem by prescribing nicotine gum to addicted patients during the hospital stay.

Nurses

While the smoking rate among physicians is significantly lower than that of the general population, the rate among nurses is not. This means that many hospitals employ large numbers of nurses who smoke. At a time when health care facilities face a nursing shortage, many are reluctant to do anything that might alienate nurses or impair their recruitment. However, hospitals that have implemented policies report that few nurses leave because of the smoking policy. Including nurses in policy formulation is regarded by many hospitals as a key factor in the overall success of the policy. When included in the process nurses are often strong supporters of smoking policies.

Marketing

Hospitals today are increasingly competitive as they fight for market share, many like to avoid policies that may potentially alienate customers. Smokers are among their best customers, for while they are a minority of the population, they have higher rates of hospitalization. Hospitals with policies, however, report no decline in admissions.

The following case studies explain how two health care facilities addressed the smoking issue. The Lexington Clinic prohibited smoking in its facilities. Swedish Hospital also prohibited smoking in its facilities.

THE LEXINGTON CLINIC

- **Smoking Prohibition**

BACKGROUND

The Lexington Clinic is a 100-physician, multi-specialty group practice clinic. Its 11 buildings are scattered throughout Lexington, Kentucky, where the Clinic has been operating for 70 years. It has no overnight facilities; patients requiring hospitalization are referred to local hospitals. However, some patients stay at the Clinic for several hours for extended procedures. The Clinic is owned by its physicians, and operated by an elected physician Board of Directors and an administrative staff. It has 650 employees, and is not unionized.

The Clinic is located in a region that many consider the burley capital of the world. Many of its patients are tobacco farmers and their families, and tobacco forms the backbone of the local economy. Clinic staff was concerned that introducing a smoking policy would potentially anger Clinic patients and supporters.

THE POLICY DEVELOPMENT PROCESS

The idea of a smoking policy was first raised in 1982. Staff, concerned about the dangers of ETS, urged management to restrict smoking. They felt that despite the community's reliance on tobacco, the Clinic should set a health standard for its patients by eliminating ETS. Management asked the Clinic's Safety Committee to study the issue.

The Safety Committee was a management committee whose members included both health care and non-health care professionals. After weighing both sides of the ETS issue---community concerns vs. the health of their patients---they recommended a policy restricting smoking to designated lobby areas, private offices and employee lounges. They felt that was consistent with what other organizations were doing about ETS, and that it would not upset the community.

But as new information surfaced about the dangers of passive smoking, staff concerns continued to grow. In late 1986, following publication of the Surgeon General's report, Clinic administrators asked the Safety Committee to re-examine the smoking issue. Their mandate was to research information on ETS and recommend a course of action.

The Safety Committee spent several months gathering information. They reviewed medical literature on the health effects of ETS, examined ventilation options, and consulted experts in the field. Finally, convinced that ETS had to be eliminated from the facilities and that proper ventilation for smoking rooms would be prohibitively expensive, the Committee recommended that smoking be banned inside Lexington Clinic facilities.

IMPLEMENTATION

Clinic administrators announced the policy in March, 1987 and scheduled it to begin on July 4th. They also appointed an employee committee of smokers, nonsmokers and ex-smokers to help plan its implementation, and a management committee to develop the programs and strategies recommended by the employee committee.

The committees' roles were to educate employees, physicians and patients about the policy, and to act as conduits for employee feedback and concerns. Using material gathered by the Safety Committee, they developed a memo explaining the health risks of ETS, the Clinic's lack of ventilation options, and the rationale for the decision to prohibit smoking. It stressed that the policy was a health initiative, not a moral crusade, and reminded people that they were free to smoke outside during employee breaks. The Committee also arranged for the Clinic to offer free smoking cessation, weight loss, and stress reduction classes to employees and their spouses.

During this period, feelings about the ban were divided. One group of physicians and employees, including both smokers and nonsmokers, supported it. They felt that as a health care facility, the Clinic had no choice but to ban a substance that could harm their patients. On the other side were smokers and nonsmokers who felt the ban would insult their many tobacco farming patients.

As July 4th crept closer, a small group of physicians and employees remained actively opposed. To address their concerns a presentation was scheduled for the Clinic's 100 physicians.

At the meeting all sides were given a chance to voice their concerns. In addition, the physicians were presented the most recent medical research, the current status of litigation and legislation, public opinion surveys, trends in smoking policies in health care facilities and other organizations, and the costs associated with permitting smoking. At the end of the presentation, an influential physican stood up. "I am a smoker," he said, "and until now I have been opposed to this ban. But in light of this information, I am changing my mind. As owners of this organization, we have a responsibility, we cannot allow smoking in our buildings." The group of physicians voted for the prohibition.

Two weeks later the policy went into effect. The Clinic built covered smoking shelters outside to protect smokers from weather and to show smokers they were aware of their needs. They kept cigarette vending machines in the buildings to remind smokers that they were not forcing them to quit, merely restricting when and where they smoke.

EVALUATION

To everyone's surprise, the ban was widely accepted from the first. According to the policy, employee enforcement is handled as it is for any Clinic policy: violators receive verbal counseling, written counseling and finally dismissal if they fail to comply. However, these

penalties have never been necessary. The occasional infractions, which are generally from patients and not staff, are curtailed with verbal reminders.

Community reaction was also positive. The local media gave the policy positive coverage. Daily visits held constant at 1,400. And while the Clinic had braced for a strong reaction from tobacco farmers, they received only two letters of complaint.

In evaluating its policy, the Lexington Clinic emphasizes the following points:

The Lexington Clinic's implementation of an aggressive communication and education effort during the three-and-a-half month adjustment period.

The establishment of an outdoor, covered smoking area.

SWEDISH HOSPITAL, SEATTLE, WASHINGTON

- **Smoking Prohibition**

BACKGROUND

Swedish Hospital, with 600 beds, is the largest hospital in the Northwest. It has a medical staff of 1,000 and occupies a dozen buildings near downtown Seattle.

THE POLICY DEVELOPMENT PROCESS

The policy development and implementation process occured in three stages over two years. It began in 1985 when the hospital's executive director, Dr. Alan Lobb, convened a Smoking Policy Committee to study the smoking issue. Lobb felt strongly about the dangers of smoking and asked the Committee, which included smoking and nonsmoking managers, to determine how the hospital could limit ETS in its facilities.

While the Committee knew that Lobb's preference was to prohibit smoking, they felt that introducing restrictions gradually would be a better way to proceed. As a first step, they created a number of no smoking areas: most of the cafeteria was made "smoke-free," and each department was asked to decide if it wanted smoking in its employee lounge. Smoking was still permitted by patients in their rooms.

The decision to allow each department to establish its own policy proved difficult, however, as department managers became caught between smokers' and nonsmokers' competing demands. Finally staff asked the Committee to create a hospital-wide policy. A year after the first policy was introduced, the Committee revised it to prohibit smoking by employees and visitors everywhere in the building. Only patients were permitted to smoke in their rooms.

Before the new policy took effect, employees objected, requesting one place in the building where smoking would be allowed. The hospital complied, and established a separately ventilated smoking room in the cafeteria. When the concentration of smoke in the small area proved too much for the ventilation system, new exhaust fans were added. Even with the new fans, the air filters had to be changed twice a week and the room's walls discolored.

After six months the medical staff of the hospital, wanting to set an example in the community, asked Dr. Lobb to recommend a complete prohibition. With the full support of the CEO and the medical staff, **the Committee then announced that Swedish would be a smoke-free hospital**. The only exception would be occasional patients who would be permitted to smoke with their doctor's agreement.

IMPLEMENTATION

Before the policy was to go into effect, memos were sent to all employees informing them of the ban and the reasons behind it. They also offered free cessation classes to all who wanted them. A relatively small number signed up, and some employees quit smoking.

Knowing it was important to reach patients before they arrived, the hospital made strong efforts in patient education. They printed "tent cards" explaining the policy and distributed them to all physicians who refer patients to Swedish, and added information about the policy to their pre-admission packets.

EVALUATION

The policy met with little resistance. The hospital received complaints from patients who argued that they had removed their only solace during sickness. The hospital answered with an explanation of the health benefits of the policy.

Compliance with the policy has been good. Enforcement is done by physicians rather than nurses. If a patient insists on smoking, his or her physician will decide whether or not the smoking should be allowed. To smoke, the patient must be in a private room, and the circumstances must be exceptional.

Concerns that smoking patients would take their business elsewhere have not been realized. Swedish has seen no decline in admissions since going smoke-free.

In evaluating its policy, Swedish Hospital emphasizes the following points:

The support of the leadership of Swedish Hospital was the key to the successful implementation of the new smoking policy.

The hospital made a strong commitment to educate patients about the policy before they are admitted to the hospital.

CHAPTER 13: Smoking Policies in Schools

Thirty-two states restrict or prohibit smoking by students.[123] Nearly as many restrict smoking by faculty to "adults only" areas. These areas are frequently under-ventilated, however, and smoke seeps easily to areas where children are present. According to the Surgeon General, "a total prohibition of smoking on school grounds provides the greatest protection from sidestream smoke exposure and unwanted role modeling effects."[124] Yet many schools are hesitant to impose such a ban for the following reasons:

Fear of Angering Teachers

Teachers are under tremendous pressure. Administrators are reluctant to add to the pressure with a potentially "unpopular" restriction. However, studies of other worksites show that smoking bans are popular with the majority of employees, and that smokers adjust to the ban within several months.

Enforcement

Like administrators in any worksite, school principals are not eager to create policies which contain potential discipline problems.

This chapter profiles the Andover Unified School District #385, which prohibited smoking for teachers as well as students. Its success led to smoke-free schools throughout the state of Kansas.

ANDOVER, KANSAS PUBLIC SCHOOLS

- **Smoking Prohibition**

BACKGROUND

With 3,600 people, Andover, Kansas might qualify as a small town---except that it is a suburb of Wichita. In the 1970's, Andover's quiet life, ample space, and small school district began attracting families from the city. By 1978 the district had grown to 1,200 students. It had one high school which permitted smoking in the building for teachers but prohibited it for students.

THE POLICY DEVELOPMENT PROCESS

By 1978, smoking in the high school had become a source of tension. Students were slipping out to smoke between classes, and at lunchtime the lawn was filled with students lighting up. Teachers were reprimanding students who took cigarettes out in school, and parents were concerned about their children's health. To ease the problem, school board members suggested prohibiting student smoking on school grounds as well as in the

buildings. However, other school board members objected that prohibiting smoking for students—while letting teachers smoke—was hypocritical and unfair. They advocated prohibiting smoking in the Andover School District for teachers as well as the students. No school district they knew of had prohibited smoking for teachers, but as the school board examined its options, it seemed like the best one.

Knowing that a prohibition might meet resistance in the community, the school board gathered ammunition. First, they polled students and teachers to find out how many smoked: the number was small. Next, they examined their insurance coverage and discovered that prohibiting smoking on school grounds would drop their property insurance premium significantly. This was a compelling argument for a fiscally conservative school board, and one they expected would be equally powerful for the community, which was currently seeking funds for a new gymnasium. The board took this information to the next public school board meeting.

To their surprise, the prohibition idea met little resistance. Parents embraced it, thankful to have help from the school in curbing their children's smoking. Most teachers cheered it, because they favored further tobacco restrictions for students, because they hoped it would reduce the tensions over smoking, or because they were eager to rid the school of ETS. Only a small group of teachers protested, claiming the school board was abridging their right to smoke, and overstepping its role as administrators.

The board discussed the issue at five public school board meetings before deciding to pass the prohibition. Ultimately they felt the writing was on the wall. The strong feelings of the community and the nation's growing intolerance for smoking suggested that if they didn't prohibit smoking themselves, the state would eventually make them do it. One school board member said, "if you wait until the state makes you do it, you've waited too long."

IMPLEMENTATION

The board announced the prohibition in August with a one-paragraph memo. It stated that beginning the following September, smoking would be prohibited for students and teachers in school buildings and on school grounds. Although some teachers had objected strongly to the prohibition while it was under discussion, complaints died down once the policy was on the books. Those who still wanted to smoke drove down the street. Most refrained from smoking during school hours. In an unexpected side benefit, the district found that without cigarettes, teachers spent less time in the faculty lounge and more time with students in hallways, schoolyards, and lunchrooms.

Enforcing the prohibition among students has been easier than enforcing the earlier policy, in part because it has eliminated the problem of students lighting up "on their way outside." According to school representatives, discipline problems are "nothing compared to what they were."

EVALUATION

In the community, the prohibition was widely supported. Parents were delighted to see the school curb smoking. The large majority of teachers approved. Even people with no connection to the schools supported the decision to protect the health of students. The local newspaper published an editorial praising the school board for its decision.

In evaluating its policy, the Andover School District emphasizes the following points:

The Andover School District worked to gain extensive public support for its effort to eliminate smoking from environments with children.

The policy was fair because it placed the same rules on teachers and students.

AFTERMATH

Nine years after Andover implemented its smoking prohibition, the state of Kansas prohibited smoking in public schools statewide. Several other school districts had followed Andover's lead, and hoping to spread the policy to the rest of the state, the Governor asked a state representative to introduce a bill in the legislature.

The debate in the legislature was partisan, divided by political party and smoking persuasion. Proponents argued that the bill was necessary to protect the health of children; opponents argued that smokers' rights were being taken away. However, the opponents were outnumbered, and in 1987, Kansas became the first state to prohibit smoking in schools for teachers as well as students. Public response was overwhelmingly positive.

RESOURCES

For additional information on ETS, contact your state or local health department, or the following:

Indoor Air Division (ANR-445)
Office of Air and Radiation
U.S. Environmental Protection Agency
401 M Street SW
Washington, D.C. 20460

Office on Smoking and Health
U.S. Public Health Service
5600 Fishers Lane, Room 1-10
Rockville, Maryland 20857

Office of Cancer Communications
National Cancer Institute
1-800-4-CANCER

American Cancer Society
4 West 35th Street
New York, New York 10001

American Lung Association
1740 Broadway
New York, New York 10019

American Heart Association
7320 Greenville Avenue
Dallas, Texas 75231

Public Relations Office
American Society of Heating, Refrigeration
and Air Conditioning Engineers (ASHRAE)
1791 Tullie Circle, NE
Atlanta, Georgia 30329

Cigarette smoke is only one of many indoor air pollutants that can affect your health and comfort. Other EPA publications concerning the quality of indoor air include:

* The Inside Story: A Guide to Indoor Air Quality
* Directory of State Indoor Air Contacts
* Indoor Air Facts #3: Ventilation and Air Quality in Offices
* Indoor Air Facts #4: Sick Buildings
* Indoor Air Facts #5: Environmental Tobacco Smoke
* Indoor Air Facts #6: Report to Congress on Indoor Air Quality
* Indoor Air Facts #7: Residential Air Cleaners

These publications, as well as additional copies of this publication, are available from:

Public Information Center
U.S. Environmental Protection Agency
Mail Code PM-211B
401 M Street SW
Washington, D.C. 20460

The National Cancer Institute has developed a series of one-page information sheets on all aspects of smoking in the workplace. These question and answer sheets were produced by the Office of Cancer Communications. For copies call 1-800-4-CANCER.

* The Health Effects of Environmental Tobacco Smoke
* Implementation of Smoking Policies
* Strategies for Selecting Smoking Cessation Programs
* Costs and Benefits of Smoking Restrictions in the Workplace
* Smoking in the Workplace: Ventilation
* Smoking in the Workplace: Legal Issues
* Smoking Policies and the Unions
* Smoking Policies in Health Care Institutions
* Smoking and the Female Work Force
* Smoking and the Blue-Collar Work Force

FOOTNOTES

1. U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES, Reducing the Health Consequences of Smoking, 25 Years of Progress, a report of the Surgeon General, 1989. DHHS Publication No. (CDC) 89-8411. p. 12.

2. U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES, Smoking and Health, A National Status Report. 1990. DHHS Publication No. (CDC) 87-8396 (Revised 2/90). p. 8.

3. U.S. ENVIRONMENTAL PROTECTION AGENCY, Health Effects of Passive Smoking: Assessment of Lung Cancer in Adults and Respiratory Disorders in Children. 1990. p. ___

4. U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES, Reducing the Health Consequences of Smoking, 25 Years of Progress, a report of the Surgeon General, 1989. op. cit. p. 11.

5. U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES, Smoking and Health, A National Status Report, op.cit. p. 8.

6. U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES, Reducing the Health Consequences of Smoking, 25 Years of Progress, a report of the Surgeon General, 1989. op. cit. p. 11.

7. NATIONAL RESEARCH COUNCIL, Environmental Tobacco Smoke, Measuring Exposures and Assessing Health Effects. 1986. ISBN 0-309-03730-1. p. 16.

8. U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES, The Health Consequences of Involuntary Smoking, a report of the Surgeon General. 1986. op cit. p. xxi.

9. ibid. p. 184.

10. CLAUSEN, G. Comfort and environmental tobacco smoke, unpub. article, 1989.

11. U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES, Reducing the Health Consequences of Smoking, 25 Years of Progress, a report of the Surgeon General, 1989. op. cit. p. 21.

12. WELLS, AJ. An estimate of adult mortality in the United States from passive smoking. Environment International, vol. 14, 1988.

13. U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES, The Health Consequences of Involuntary Smoking, a report of the Surgeon General. op. cit. p. 135.

14. WELLS, AJ, Passive smoking and adult mortality. Paper, 6th World Conference on Smoking and Health, Tokyo, 1987. Public Smoking and Health 1987, Aoki M, Hisamichi S, Tominaga S. (Excerpta Medica, Amsterdam, New York, Oxford, 1988)

15. U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES, The Health Consequences of Involuntary Smoking, a report of the Surgeon General. op. cit. p. 14.

16. RICKERT, W., ROBINSON, JC., COLLINSHAW, N. Yields of tar, nicotine and carbon monoxide in the sidestream smoke from 15 brands of canadian cigarettes, American Journal of Public Health 74(3): 228-231, 1984

17. U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES, the Health Consequences of Involuntary Smoking, A Report of the Surgeon General, op. cit. p.131.

18. RICKERT, W.S.; ROBINSON, J.C.;COLLISHAW, N.E. (1984) Sidestream Yields of Tar, Nicotine, and Carbon Monoxide from 15 Brands of Canadian Cigarettes. Am. J. Publ. Health 74:228-231

19. U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES, Reducing the Health Consequences of Smoking, 25 Years of Progress, a report of the Surgeon General, 1989. op. cit. p. 82-85.

20. ibid, p. 486.

21. ibid, p. 85.

22. U.S. DEPARTMENT OF HEALTH, EDUCATION AND WELFARE. Smoking and Health: A Report of the Surgeon General. 1979. DHEW Publication No. (PHS) 79-50066, 11-5

23. U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES, The Health Consequences of Involuntary Smoking, a report of the Surgeon General. op. cit. p. 127-134.

24. U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES, Reducing the Health Consequences of Smoking, 25 Years of Progress, a report of the Surgeon General, 1989. op. cit. p. 50.

25. U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES, The Health Consequences of Involuntary Smoking, a report of the Surgeon General. op. cit. p. 128.

26. SMITH, KR. Air pollution, assessing total exposure in the United States, Environment, 30(8): 37. 1988.

27. SPENGLER, JD., DOCKERY, DW., TURNER, WA., WOLFSON, JM., FERRIS, BG, Jr. Long-term measurements of respirable sulfates and particles inside and outside homes. Atmospheric Environment 15(1):23-30, 1981.

28. SAMET, J., MARBURY, M., SPENGLER, J. Health effects and sources of indoor air pollution, American Review of Respiratory Disease 136:1491, 1987.

29. MIESNER, EA., et al. Report to the U.S. Environmental Protection Agency, Cooperative Agreement No. CR 813526-01-0, Harvard School of Public Health, 1988.

30. REPACE, JL., LOWERY, AH. Indoor air pollution, tobacco smoke and public health, Science 208:464-472, 1980; Tobacco smoke, ventilation and indoor air quality, American Society of Heating, Refrigerating and Air Conditioning Engineers, Inc. Transactions, 88 (part 1) 895-914, 1982.

31. MEISNER, op. cit.

32. SAMET, J., MARBURY, M., SPENGLER, J. Health effects and sources of indoor air pollution, op cit. p. 1491.

33. MCCARTHY, J., SPENGLER, J., CHANG, B. A personal monitoring study to assess exposure to environmental tobacco smoke. Proceedings of the 4th International Conference on Indoor Air Quality and Climate, Berlin (West), 17-31 August, 1987.

34. SPENGLER, JD., TOSTESON, TD. Statistical models for personal exposures data, Paper presented at Environmetrics 81. Conference of the Society for Industrial and Applied Mathematics, Alexandria, Virginia, April, 1981.

35. NATIONAL RESEARCH COUNCIL, Environmental Tobacco Smoke, Measuring Exposures and Assessing Health Effects, op. cit. 137-145.

36. LUCK, W., NAU, H. Nicotine and cotinine concentrations in serum and urine of infants exposed via passive smoking or milk from smoking mothers. Journal of Pediatrics, 107:816-20, 1985.

37. U.S. ENVIRONMENTAL PROTECTION AGENCY, Health Effects of Passive Smoking: Assessment of Lung Cancer in Adults and Respiratory Disorders in Children. 1990. p. ___

38. MCCARTHY, J., SPENGLER, J., CHANG, B. A personal monitoring study to assess exposure to environmental tobacco smoke. op. cit.

39. WALLACE, LI et. al., Exposures to benzene and other volatile compounds from active and passive smoking, Archives of Environmental Health 42(5):209-221, 1978.

40. ibid

41. U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES, The Health Consequences of Involuntary Smoking, a report of the Surgeon General. op. cit. p. 230.

42. ibid. p. 230

43. CLAUSEN, GH, et al. Sensory irritation from exposure from environmental tobacco smoke. Berlin IAQ Conference proceedings. 1987.

44. TRICHOPOULOS, D. et al. Lung cancer and passive smoking: conclusion of Greek study (letter). Lancet 2:667-668, 1983.

45. HIRAYAMA, T. Non-smoking wives of heavy smokers have a higher risk of lung cancer: A study from Japan. British Medical Journal 282:183-185, 1981.

46. U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES, The Health Consequences of Involuntary Smoking, a report of the Surgeon General. op. cit. p. 10, 13.

47. NATIONAL RESEARCH COUNCIL, Environmental Tobacco Smoke, Measuring Exposures and Assessing Health Effects. op. cit.

48. AKIBA et.al., 1986; BROWNSON et al., 1987; CHAN and FUNG, 1982; CORREA et al., 1983; GAO et al., 1987; GARFINKEL, 1981; GARFINKEL et al., 1985; GILLIS et al., 1984; HIRAYAMA, 1981a, 1984; HUMBLE et al., 1987; INOUE and MIRAIJAMA, 1988; KABAT and WYNDER, 1984; KOO et al., 1987; LAM et al., 1987; LAM, 1985; LEE at al., 1986; PERSHAGEN et al., 1987; SHIMIZU et al., 1988; SVENSSON et al., 1988; TRICHOPOULOS et al., 1981; VARELA, 1987; WU et al., 1985.

49. U.S. ENVIRONMENTAL PROTECTION AGENCY, Health Effects of Passive Smoking: Assessment of Lung Cancer in Adults and Respiratory Disorders in Children. 1990. p. ___

50. SPENGLER, JD. Exposures to air pollutants. Harvard School of Public Health. 1988

51. SPENGLER, JD. Exposures to air pollutants. Harvard School of Public Health. 1988

52. HOFFMAN, D., BRUNNEMAN, KD., HALEY, NJ. Absorption of smoke constituents by nonsmokers. American Health Foundation, 1988.

53. NATIONAL RESEARCH COUNCIL, Environmental Tobacco Smoke, Measuring Exposures and Assessing Health Effects. 1986. op. cit. p. 211.

54. ibid. p. 9.

55. ibid. p. 274

56. NATIONAL RESEARCH COUNCIL, Environmental Tobacco Smoke, Measuring Exposures and Assessing Health Effects. 1986. op. cit. p. 9.

57. U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES, The Health Consequences of Involuntary Smoking, a report of the Surgeon General. op. cit. p. 63-64.

58. NATIONAL RESEARCH COUNCIL, Environmental Tobacco Smoke, Measuring Exposures and Assessing Health Effects. 1986. op. cit. p. 213-215.

59. GARLAND, C., BARRETT-CONNOR, E., SUAREZ, L., CRIQUI, MH., WINGARD, D. Effects of passive smoking on ischemic heart disease mortality of nonsmokers. American Journal of Epidemiology, 121(5):649, 1985.

60. ibid. p. 649

61. NATIONAL RESEARCH COUNCIL, Environmental Tobacco Smoke, Measuring Exposures and Assessing Health Effects. op. cit. p. 176-177.

62. GILLIS et al., 1984; LEE et al., 1986; SVENDSEN et al., 1987; HELSING et al., 1988; HIRAYAMA, 1986; GARLAND et al., 1985; MARTIN et al., 1986; HE, 1989; HUMBLE et al., 1990; HOLE et al., 1989.

63. HIRAYAMA, T. Cancer mortality in nonsmoking women with smoking husbands based on a large scale cohort study in Japan, Preventive Medicine 13: 680-90, 1980.

64. SANDLER, DP., EVERSON, RB., WILCOX, AJ. Passive Smoking in Adulthood and Cancer Risk, American Journal of Epidemiology, 121:37-48, 1985.

65. SLATTERY, ML. et al. Cigarette smoking and exposure to passive smoke are risk factors for cervical cancer. Journal of the American Medical Association, 261(11) March 17, 1989

66. SANDLER, DP., EVERSON, RB., WILCOX, AJ. Passive Smoking in Adulthood and Cancer Risk. op cit. p. 37-48

67. SANDLER, DP. et al. Cancer risk in adulthood from early life exposure to parents' smoking. American Journal of Public Health 75:487-92, 1985.

68. SANDLER, D.P., EVERSON, R.B., WILCOX, A.J. Cumulative Effects of Lifetime Passive Smoking on Cancer Risk. Lancet 1:312-5, 1982

69. PRESTON-MARTIN, S. et al. N-nitroso compounds and childhood brain tumors: a case-control study. Cancer Research 42:5240-5, 1982

70. U.S. ENVIRONMENTAL PROTECTION AGENCY, Health Effects of Passive Smoking: Assessment of Lung Cancer in Adults and Respiratory Disorders in Children. 1990. p. ___

71. AKIBA et.al., 1986; BROWNSON et al., 1987; CHAN and FUNG, 1982; CORREA et al., 1983; GAO et al., 1987; GARFINKEL, 1981; GARFINKEL et al., 1985; GILLIS et al., 1984; HIRAYAMA, 1981a, 1984; HUMBLE et al., 1987; INOUE and MIRAIJAMA, 1988; KABAT and WYNDER, 1984; KOO et al., 1987; LAM et al., 1987; LAM, 1985; LEE at al., 1986; PERSHAGEN et al., 1987; SHIMIZU et al., 1988; SVENSSON et al., 1988; TRICHOPOULOS et al., 1981; VARELA, 1987; WU et al., 1985.

72. REPACE, J.L.; LOWERY, A.H. Risk Assessment Methodologies for Passive Smoking Induced Lung Cancer, Risk Analysis, Vol. 10, No. 1, March 1990.

73. WILLIAMS, DC., WHITTAKER, JR., JENNINGS, WG. Measurement of nicotine in building air as an indicator of environmental tobacco smoke levels, Environmental Health Perspectives, volune 60, p. 405-410, 1985.

74. U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES, The Health Consequences of Involuntary Smoking, a report of the Surgeon General. op. cit. p. 7.

75. U.S. ENVIRONMENTAL PROTECTION AGENCY, Residential Air- Cleaning Devices, January 1990.

76. ELECTRIC POWER RESEARCH INSTITUTE. Manual on Indoor Air Quality. 1984. Prepared by Lawerence Berkeley Laboratory, Berkeley California for the Energy Management and Utilization Division, Electric Power Research Institute, Palo Alto, CA. EPRI EM-3469.

77. CLAUSEN, GH., MOLLER, SB., FANGLER, PO. The impact of air washing on environmental tobacco smoke odor. In B. Seifert et al. (eds.) Proceedings of Indoor Air 87, Berlin, 2:47-51, 1987

78. INTERNATIONAL AGENCY FOR RESEARCH ON CANCER. Tobacco Smoking. IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Humans, Vol. 38, Lyon, IARC, 1986.

79. FINAL REPORT, TOBACCO USE IN AMERICA CONFERENCE, American Medical Association, Federal Regulation of Tobacco Products, p. 13, 1989

80. NATIONAL ACADEMY OF SCIENCES. The Airliner Cabin Environment: Air Quality and Safety, p. 150, 1986.

81. U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES, Smoking and Health, A National Status Report. 1990. op. cit. p. 9.

82. SEVENTH WORLD CONFERENCE ON TOBACCO AND HEALTH ABSTRACTS, *An Analysis of the Scope and Content of Clean Indoor Air Legislation in the United States,* Rigotti N., Perth, 1990.

83. MAJOR LOCAL SMOKING ORDINANCES IN THE UNITED STATES, NIH PUBLICATION NUMBER 90-479, 1989.

84. SHIMP V. NEW JERSEY BELL, 145 N.J. Super 516. 368 A. 2nd 408. 1976.

85. SMITH V. WESTERN ELECTRIC CO., 643 S.W. 2nd 10 Missouri Court of Appeals, 1982.

86. GORDON V. RAVEN SYSTEMS, INC. 462 A. 2nd 10 D.C. 1983.

87. LEE V. DEPARTMENT OF PUBLIC WELFARE, Suffolk County (MA) Superior Court, C.A. #63777 (1985).

88. PLETTEN V. DEPARTMENT OF THE ARMY, Number 03810087 Equal Employment Opportunity Commission, April 8, 1983.

89. VICKERS V. VETERNS ADMINISTRATION, 549 F. Supp. 85, 86-87 W.D. Washington 1982.

90. PARODI V. MERIT SYSTEMS PROTECTION BOARD, 690 F., 2nd 731 9th Circuit 1982.

91. HAYES, J. State Ordered to Compensate Non-smoking Employee, Oregonian, 2/8/85.

92. MCCARTHY V. DEPARTMENT OF SOCIAL AND HEALTH SERVICES, 46 Wash. App. 125, 730 P.2d 681, 1986.

93. DIEFENTHAL V. CAB, U.S. Court of Apppeals, Fifth Circuit, August, 1982.

94. GRUSENDORF V. CITY OF OKLAHOMA CITY, 816 F 2d. 539 (10th Circ. 1987).

95. MINNESOTA DEPARTMENT OF HUMAN RIGHTS, D.C.A., Inc., Ref. No. E16971 (1938).

96. AMERICAN MANAGEMENT SOCIETY, Smoking Policies Survey, p. 7-9, 1989.

97. SMOKING POLICY INSTITUTE, 90 Days to a Smoke Free Workplace, Simon and Schuster, 1987.

98. U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES, Smoking and Health, A National Status Report. 1990. op. cit. p. 8.

99. KRISTEIN, MM. Economic issues in prevention, Preventive Medicine 6:252-64, 1977.

100. KRISTEIN, MM. The economics of health promotion at the worksite, Health Education Quarterly 9:27-36, 1982.

101. KRISTEIN, MM. How much can business expect to profit from smoking cessation? Preventive Medicine, 12:358-381, 1983

102. KRISTEIN, MM. Economic issues related to smoking in the workplace, New York State Journal of Medicine January, 1989.

103. WEIS, WL. No ifs, ands or butts--why workplace smoking should be banned. Management World, p. 39-44, September, 1981.

104. WEIS, WL. Toward a smoke-free work environment, Employee Services Management, April, 1985.

105. WEIS, WL. Increasing productivity through on-site smoking control, Health Care Strategic Management, April, 1985.

106. WEIS, WL. A smoke cloud over tobacco's future, Business and Society Review, Winter, 1985.

107. WEIS, WL. The smoke-free workplace: cost and health consequences, Paper presented at the 5th World Conference on Smoking and Health, 1983.

108. AMERICAN MANAGEMENT SOCIETY, Smoking Policies Survey, op cit. p. 19.

109. MEMO FROM AETNA JANITORIAL SERVICE TO UNIGARD INSURANCE CO., July 6, 1982.

110. LUCE, BR., SWEITZER, SO. Smoking and alcohol abuse: a comparison of their economic consequences. New England Journal of Medicine, 1978.

111. NAUS, S.A. et al. Work injuries and smoking, Industrial Medical Surgery 35:880-881, 1966.

112. KRISTEIN, MM. How much can business expect to profit from smoking cessation? op. cit.

113. U.S. DEPARTMENT OF HEALTH, EDUCATION AND WELFARE. Smoking and Health: A Report of the Surgeon General. 1979. op. cit.

114. KRISTEIN, MM. How much can business expect to profit from smoking cessation?, op. cit.

115. WEIS, WL. The smoke-free workplace: cost and health consequences, Paper presented at the 5th World Conference on Smoking and Health, 1983.

116. U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES, The Health Consequences of Involuntary Smoking, a report of the Surgeon General. op. cit. p. 303.

117. ANNUAL MEETING OF THE AMERICAN PUBLIC HEALTH ASSOCIATION ABSTRACTS, Excess Insured Health Care Costs from Tobacco Using Employees in a Large Group Plan, Penner M., Chicago, 1989.

118. PERSONAL CORRESPONDENCE, *Dr. C. Biscard, Pacific Bell Medical Director*, April 1, 1990.

119. U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES, The Health Consequences of Involuntary Smoking, a report of the Surgeon General. 1986. p. 281

120. BEIL, LD., THOMPSON, M. Pacific Northwest Bell's approach to implementing a no-smoking policy, Modern Job Safety and Health, October 14, 1987.

121. ROCKEFELLER, K., Masters Thesis. University of Washington School of Public Health. 1990.

122. U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES, Public Health Service, Centers for Disease Control, Morbidity and Mortality Weekly Report, Vol. 36, No. 22. 1987.

123. U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES, Reducing the Health Consequences of Smoking, 25 Years of Progress, a report of the Surgeon General, 1989. op. cit. p. 582

124. U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES, The Health Consequences of Involuntary Smoking, a report of the Surgeon General. op. cit. p. 284

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